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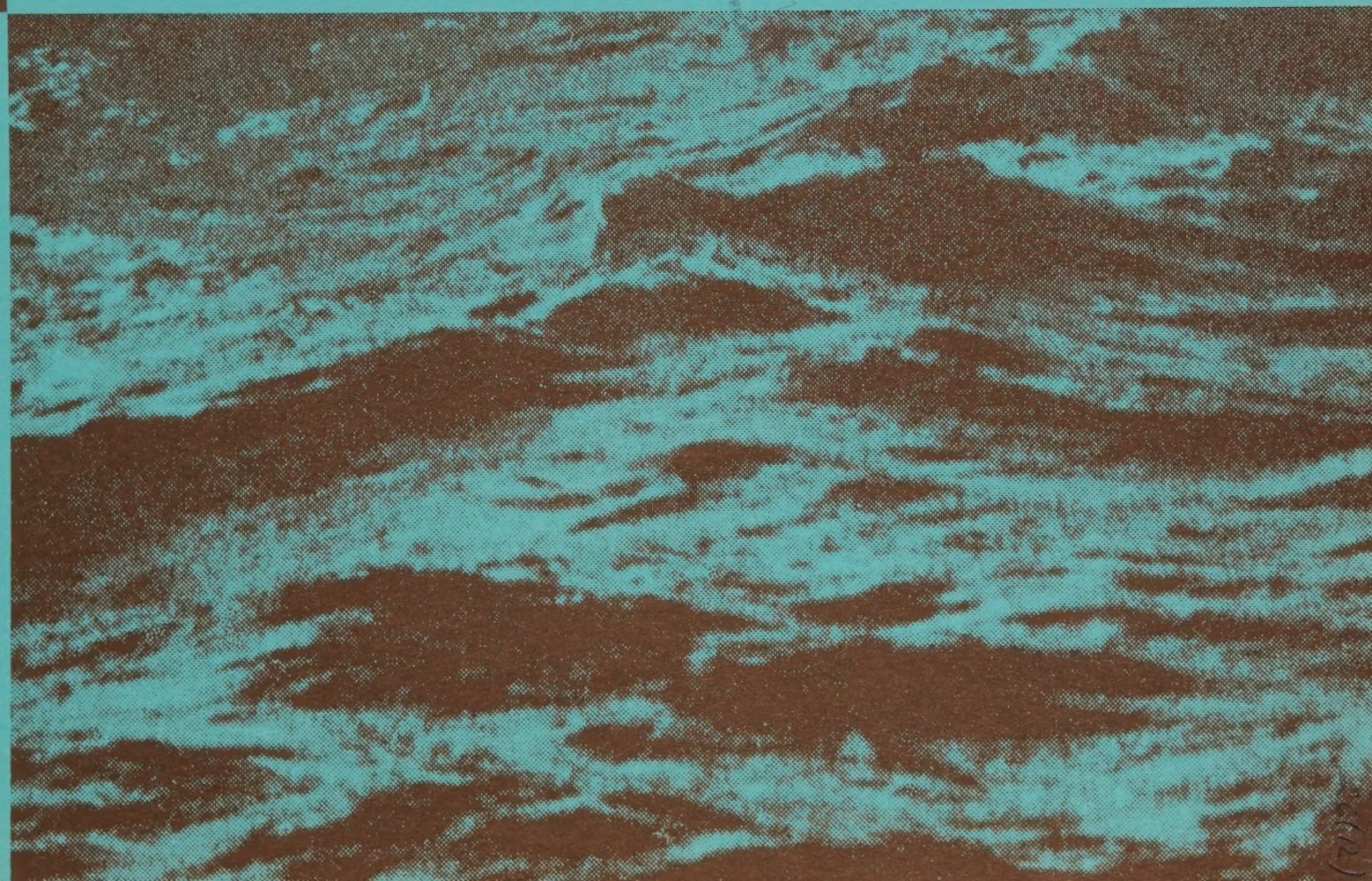

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

For sale by the Superintendent of Documents, U.S. Government Printing Office Washington, D.C. 20402 - Subscription price: $6.50 per year, ($1.75 additional for foreign mailing). Single copy 65 cents.

0.36 (8.8) [RELATIONSHIP BETWEEN THE TENDERNESS OF FISH MEAT AND ITS PROTEIN/WATER/FAT AND PROTEIN/WATER COEFFICIENTS]

Tsuladze, E. A. (Gruzinskoe Otdelenie VNIRO, U.S.S.R.)
Rybnoe Khozyaistvo No. 7, 68-69 (1972) (In Russian)
Food Science and Technology Abstracts 5, No. 6, 154, Abstract No. 6R275 (June 1973)

Protein/water and protein/water/fat coefficients were determined for certain species of freshwater and marine fish of the Georgian S.S.R. The values of each coefficient were inversely related to the tenderness of the fish meat. There was no correlation between the fat content and the tenderness of the fish meat. FTP

0.38 (6.15) ENZYMIC SOLUBILIZATION OF AN INSOLUBLE SUBSTRATE, FISH PROTEIN CONCENTRATE. PROCESS AND KINETIC CONSIDERATIONS

Archer, Michael C., Jon O. Ragnarsson, Steven R. Tannenbaum, and Daniel I. C. Wang (Dep. Nutr. Food Sci., Massachusetts Inst. Technol., Cambridge, Mass.)
Chemical Abstracts 78, No. 13, 83015t (Apr. 2, 1973)

0.38 (1.3) POLYMORPHISM OF MALATE DEHYDROGENASE ISOENZYMES IN PACIFIC OCEAN SALMON

Slyn'ko, V. I. (Lab. Genet., Inst. Biol. Morya, Vladivostok, U.S.S.R.)
Chemical Abstracts 79, No. 16031c (July 23, 1973)

0.39 (2.9) N-NITROSATION BY NITRITE ION IN NEUTRAL AND BASIC MEDIUM

Keefer, Larry K., and Peter P. Roller (Division of Cancer Cause and Prevention, National Cancer Institute, Bethesda, MD 20014)
Science 181, No. 4106, 1245-1247 (Sept. 28, 1973)

Other reports have suggested that carcinogenic N-nitrosamines can be produced only in acidic medium. In this present report, experimental nitrosation was described in neutral and basic media in the presence of a catalyst. At room temperature, and through the pH range of 6.4 to 11.0, the reaction of diethylamine with sodium nitrite in the presence of formaldehyde yielded appreciable amounts of diethylnitrosamine. Under these conditions, no nitrosamine could be detected above pH 7.5 when formaldehyde was excluded from the reaction. The authors suggest that the high yields under mild conditions of these reactions gives them potential for the synthesis of nitrosamines, especially those involving participating compounds containing acid-labile functional groups. Chloral (an aldehyde) was almost half as active as formaladehyde in catalyzing nitrosation under alkaline conditions. Another aldehyde and acetone were also tested but failed to catalyze nitrosation under alkaline conditions. The authors concluded that catalytic activity is dependent on the structure of the carbonyl compounds used in the experiments. The authors suggest that the mechanism of catalysis involves interaction of the aldehyde with the secondary amine, initially. The intermediate products would then react with the nitrite ion to produce nitrosamine, the end product.

0.39 (2.9) POTENTIAL PRECURSORS OF N-NITROSOPYRROLIDINE IN BACON AND OTHER FRIED FOODS

Bills, Donald D., Kjell I. Hildrum, Richard A. Scanlan, and Leonard M. Libbey (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of Agricultural and Food Chemistry 21, No. 5, 876-877 (Sept.-Oct. 1973)

In earlier work, N-nitrosopyrrolidine (NPy) and N-nitroso derivatives of dimethylamine, diethylamine, and piperidine, were isolated from samples of fried bacon. NPy appears to be formed when bacon is fried in a conventional manner but may not be present in raw bacon. The purpose of the present study was to determine the possibility of producing NPy from several possible precursors in a system designed to simulate the frying of foods containing small amounts of water. To simulate the physical conditions of frying bacon, a 200-ml balloon flask was equipped with a reflux condenser. One hundred ml of steam-stripped vegetable oil (mixture of processed soybean and cottonseed oil), 1 ml of water, a boiling chip, an internal standard (40 mg of methyl myristate), and 0.005 mol of the compound to be tested were placed in the flask. The temperature of the contents of the flask was brought to 170° C in 10 min and held at that temperature for 10 min. The use of an internal standard provided a means to compensate for losses of NPy that undoubtedly occurred during distillation, extraction, and concentration without the need to determine percent recovery. Equimolar amounts of the test compound and sodium nitrite were added to the system prior to heating, with the exception of tests on N-nitrosoproline. N-nitrosoproline, pyrrolidine, spermidine, proline,

0.31 (1.9)(1.92) FISH OILS. V. PHOSPHOLIPID COMPOSITION OF ANGUILLA VULGARIS AND MUGIL CEPHALUS

Shoeb, Z. E., F. M. Salama, and A. S. El-Nockrashy (Fats Oils Lab., Natl. Res. Cent., Cairo, United Arab Republic)
Chemical Abstracts 79, No. 5, 29591k (Aug. 6, 1973)

0.39 (2.9)

Since formaldehyde is widely distributed, significant environmental synthesis of nitrosamines must now be considered possible in nonacidic media. For example, formaldehyde is abundant in smoke used for smoking ham and fish, two products which have been reported to contain dimethylnitrosamine. A number of other aldehydes which might have the property of catalyzing nitrosation could be present in foodstuffs and in the environment. The authors suggest to those investigators studying environmental nitrosation the following points: (1) descriptions of nitrosation by enzymatic syntheses must demonstrate, not assume, the absence of catalysis in a boiled medium; (2) estimates of in vivo nitrosamine yields on the basis of data from in vitro model systems must consider the possibility of catalysis by aldehydes of nitrosation in gastric contents and other acidic media; and (3) the intermediate compounds produced by the initial catalytic reaction of aldehyde with compounds other than secondary amines should be considered as possible sources of nitrosamines.

[1 figure, 32 references] SW

0.33 DISCOLORATION OF AUTOXIDIZED LIPID BY THE REACTION WITH VBN [VOLATILE BASIC NITROGEN] OR NON-VBN FRACTION FROM FISH MUSCLE

Nakamura, Takashi, Kazuto Yositake, and Masamichi Toyomizu (Lab. Fish. Technol., Kyushu Univ., Fukuoka, Japan)
Chemical Abstracts 79, No. 13, 77126j (Oct. 1, 1973)

0.39 (2.9)

and puteresine produced N-nitrosopyrrolidine in yields of 2.6, 1.0, 1.0, 0.4, and 0.04% of the theoretical yield, respectively. Glutamine, glutamic acid, and hydroxyproline did not produce N-nitrosopyrrolidine under conditions of the test.

[1 table, 6 references] FTP

0.36 (3.239) MUSCULAR PROTEINS OF FISH. XI. EFFECT OF FREEZING OF DENATURATION OF ACTOMYOSIN ATPASE FROM CARP MUSCLE

Arai, Kenichi, and Reiji Takashi (Fac. Fish., Hokkaido Univ., Hakodate, Japan)
Chemical Abstracts 79, No. 7, 41067b (Aug. 20, 1973)

0.36 (1.69) CHANGES IN BLOOD GLUCOSE IN PLEURONECTES PLATESSA FOLLOWING CAPTURE FROM THE WILD. STRESS REACTION

Wardle, C. S. (Mar. Lab., Aberdeen, Scotland)
Chemical Abstracts 79, No. 3, 16036h (July 23, 1973)

0.38 GENETICS OF FISH ISOENZYMES

Salmenkova, E. A. (Inst. Biol. Morya, Vladivostok, U.S.S.R.)
Chemical Abstracts 79, No. 5, 29559f (Aug. 6, 1973)

0.38 HEAT RESISTANCE OF MUSCLES AND OF CHOLINESTERASE OF MUSCULAR HOMOGENATES OF STURGEON, STERLET, AND THEIR HYBRIDS

Kusakina, A. A. (Lab. Comp. Cytol., Inst. Cytol., Leningrad, U.S.S.R.)
Chemical Abstracts 79, No. 5, 29575h (Aug. 6, 1973)

0.39 NITROGEN FIXATION BY ANABAENA CYLINDRICA.
I. LOCALIZATION OF NITROGEN FIXATION IN THE HETEROCYSTS

Weare, N. M., and J. R. Benemann (Dept. Chem., Univ. California, San Diego, CA
Arch. Mikrobiol. 90, No. 4, 322-332 (1973)
Aquatic Sciences & Fisheries Abstracts 3, No. 8, 61, Abstract No. 3Q8329f (Aug. 1973)

Subjecting cultures of nitrogen fixing A. cylindrica to blending results in a loss of nitrogenase activity which is correlated with the breakage of filaments at the junctions between heterocysts and vegetative cells. Nitrogen-fixation activity in the dark was less than 50% of activity in light. Nitrogenase activity was lost in about 3 h when cultures of A. cylindrica were incubated aerobically in the absence of light. Reexposure to light resulted in recovery of nitrogenase activity within 2 h. Heterocysts were concluded to be the sites of nitrogenase activity, and a model for nitrogen fixation by A. cylindrica was proposed. SW

0.39 FIXATION OF CARBON DIOXIDE AND SOME OF THE ENZYMES
(0.38) INVOLVED IN COD EGGS

Mounib, M. Said, and Joanne S. Elsan (Halifax Lab., Fish. Res. Board Canada, Halifax, Nova Scotia, Canada)
Chemical Abstracts 79, No. 3, 16089c (July 23, 1973)

0.39 EFFECT OF VINBLASTINE, COLCHICINE, SODIUM, POTASSIUM, AND ADRENALINE ON PIGMENT MIGRATION OF MELANOPHORES IN TEN SPECIES OF TELEOSTS

Junqueira, L. C. U. (Inst. Cienc. Biomed., Univ. São Paulo, São Paulo, Brazil)
Chemical Abstracts 78, No. 21, 132308b (May 28, 1973)

0.39 COPPER AND ZINC LEVELS BEFORE AND AFTER SPAWNING OF
(8.42) ABRAMIS (FISH) OF THE CENTRAL REGION OF THE KUIBYSHEV RESERVOIR

Nazrenko, L. D. (U.S.S.R.)
Chemical Abstracts 79, No. 7, 40127j (Aug. 20, 1973)

0.39 CYTOGENETIC ANALYSIS OF PSEUDOLINKAGE OF LDH
(1.37) [LACTATE DEHYDROGENASE] LOCI IN THE TELEOST GENUS SALVELINUS

Davisson, Muriel Trask, James E. Wright, and Louisa M. Atherton (Dep. Biol., Pennsylvania State Univ., University Park, Pa.)
Chemical Abstracts 79, No. 7, 40202e (Aug. 20, 1973)

0.39 IONIC COMPOSITION OF THE LATERAL-LINE CANAL FLUID
(1.71) OF DOGFISH

Liddicoat, Jennifer D., and B. L. Roberts (Lab. Mar. Biol. Assoc., Plymouth, England)
Chemical Abstracts 79, No. 3, 16045k (July 23, 1973)

0.4 A STIMULATORY APPARATUS FOR STUDYING THE OLFACTORY ACTIVITY
(9.1) IN FISHES

Hara, T. J., Y. M. C. Law, and E. Van Der Veen (Fisheries Research Board of Canada, Freshwater Institute, Winnipeg, Manitoba R3T 2N6, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 2, 283-285 (Feb. 1973)

This paper contains a description of the apparatus and technique to record, for extended periods of time, the electrical response from the olfactory bulbs of fishes. It was successfully used on the olfactory systems of rainbow trout and brook trout, but it could be adapted to other species of fish. The technique would find use, for example, in testing the effects of water-borne pollutants on the olfactory system of fishes.
[3 figures, 3 references] FTP

0.4 ANTIPLASMIC AND ANTIINFLAMMATORY AGENTS FOR
(9.16) PANCREAS NECROSIS CONTROL IN FISH

Inoue, Shinichi (Daiichi Seiyaku Co., Ltd.) (pat.)
Japan. Kokai 73 40,926 (June 15, 1973)
Chemical Abstracts 79, No. 15, 87619m (Oct. 15, 1973)

0.39 METABOLISM OF DIMETHYLNITROSAMINE BY AMPHIBIANS AND FISH IN VITRO

Montesano, R., A. J. Ingram, and P. N. Magee (Cent. Int. Rech. Cancer, WHO, Lyons, France)
Chemical Abstracts 79, No. 13, 74680z (Oct. 1, 1973)

0.4 (1.951) VENTRICULAR DILATATION IN THE DIVING SEAL

Blix, A. S., and R. Hol (Inst. Arait. Med., R. Norweg. Air Force, Blinders, Oslo, Norway)
Acta Physiol. Scand. 87, No. 3, 431-432 (1973)
Aquatic Sciences & Fisheries Abstracts 3, No. 8, 92, Abstract No. 3Q8480M (Aug. 1973)

Information on the functional properties of the heart of a diving seal was obtained during an angiographic examination of a harp seal making 10-18 min dives. After 6 min of submersion the angiograms showed that the right ventricle of the heart was strikingly dilated with a large end systolic volume. This condition closely resembles that of humans during acute cardiac infarction. During acute coronary insufficiency in the dog, earlier reports indicate that ventricular dilatation represents the most important compensatory mechanism in the maintenance of cardiac output and external ventricular performance. The authors suggest the reversible ventricular dilatation of the seal may represent an important life-secureing mechanism during dives. SW

0.39 (6.32) SULFATED POLYSACCHARIDES SYNTHESIS IN BROWN ALGAE

Evans, L. V., Margaret Simpson, and Maureen E. Callow (Dep. Plant Sci., Univ. Leeds, Leeds, England)
Chemical Abstracts 78, No. 21, 133402q (May 28, 1973)

0.4 (9.12)(9.6) THE EFFECTS OF PRESSURE ON ORGANISMS

Sleigh, M. A., and A. G. MacDonald (editors)
Cambridge University Press, London (1972), xii + 516 pp. Price £8.
Frank H. Johnson (reviewer)
Nature 245, No. 5422, 223-224 (Sept. 28, 1973)

The 24 articles and 3 abstracts in this book are based on papers given at the 26th Symposium of the Society for Experimental Biology in 1971. Topics range from basic aspects of physics and physical chemistry of increased pressures to the effects of pressure on molecular systems and such complex processes as adaptation and vertical migratory behavior of fishes. Physiological processes of marine and terrestrial animals (including man) under pressure are included. Many opportunities for research are described in the book with emphasis on studies of animals indigenous to the deep sea. SW

0.5 (1.81) MICROBIAL FLORA AND LEVEL OF VIBRIO PARAHAEMOLYTICUS OF OYSTERS (CRASSOSTREA VIRGINICA), WATER AND SEDIMENT FROM GALVESTON BAY

Vanderzant, C., and C. A. Thompson, Jr. (Dept. of Animal Science, Texas Agricultural Experiment Station, College Station, TX 77843), and S. M. Ray
Journal of Milk and Food Technology 36, No. 9, 447-452 (Sept. 1973)

V. parahaemolyticus in oysters has been isolated from widely different marine environments in the United States, Japan, and countries bordering the Baltic Sea. The organism has been implicated in outbreaks of gastroenteritis in association with consumption of seafood. The potential of oysters in contributing to foodborne illness was evaluated. Experiments were performed to determine the level and type of bacterial flora in oysters; and the distribution of V. parahaemolyticus in oysters, water, and sediment from Galveston Bay, Texas, was investigated.

The results indicate that the aerobic plate counts of dilutions of freshly harvested oysters incubated at 25° C ranged from 2.3×10^4 to 3.0×10^7/g; those of sediment samples ranged from less than 10^2 to 3.0×10^6/g; and counts of water samples were less than 10^2/ml. Species of Vibrio, Aeromonas, and Moraxella predominated in the oyster samples. V. parahaemolyticus was isolated from 39 of 66 oyster samples, and 9 of 30 sediment and water samples. The organism was found in only one of eight refrigerated oyster samples taken from retail markets. In addition, Aeromonas and Moraxella species predominated in the oysters taken from these markets.

[4 figures, 5 tables, 33 references] SW

1.951 (9.17) THE STATUS OF COMMON SEALS IN SHETLAND

Bonner, W. N., R. W. Vaughan (Seals Research Division, Institute for Marine Environmental Research, Natural Environment Research Council, Fisheries Laboratory, Lowestoft, Suffolk, England), and L. Johnston
Biological Conservation 5, No. 3, 185-190 (July 1973)

A small-scale sealing industry has been operating for a long time in the coastal waters of the Shetland Islands. Before 1960, 300 to 400 seals, mostly pups, were killed annually. Between 1962 and 1968, the number of young seals killed annually rose to 900, exclusive of adults. Interest in maintaining the stock of seals was expressed by those concerned, including the hunters, who believed that the stock was declining. The major cause of the decline was attributed to the high level of pup killing. In actions to conserve the stock, the most important skin dealer made no purchases in 1968, and one of the principal hunters gave up sealing.

To investigate the status of the Shetland common seal, a search was made at various sites on the coastline of the islands in 1971. Counts were made at each site, and the total number was found to be 1,219 seals. Due to the uncertainty of the actual count because of seals at sea or the possibility of counting the same seals twice, the authors estimated the population to lie between 1,500 and 2,500 animals. The authors were inclined to rely on the opinions of the hunters and boatmen who expressed the belief that the seal population was declining, but the rate of decline was unknown.

[2 figures, 4 tables, 4 references] SW

1.87 (1.0115)(9.6) LOBSTERING INSHORE AND OFFSHORE

Doliber, Earl L. (Marblehead, Mass.)
International Marine Publishing Co., Camden, Me. (Aug. 1973), 108 pp. Price $5.95.

This book is a brief description of the inshore and offshore lobster (Homarus americanus) fishery of the northeast coastal area of the United States. The six chapters deal with the natural history of the lobster, history of lobster fishing, the men and equipment, inshore and offshore fishing methods, the fishing grounds, and the prospects for the future. The book contains many illustrations, has a glossary of terms, and contains a bibliography of 29 references. FTP

2.00 (1.85) CHEMICAL CHARACTERISTICS, BACTERIAL COUNTS, AND POTENTIAL SHELF-LIFE OF SHRIMP FROM VARIOUS LOCATIONS ON THE NORTHWESTERN GULF OF MEXICO

Cobb, B. F., III, C. Vanderzant, C. A. Thompson, Jr., and C. S. Custer (Dept. of Animal Science, Texas Agricultural Experiment Station, College Station, TX 77843)
Journal of Milk and Food Technology 36, No. 9, 463-468 (Sept. 1973)

Results of earlier work indicate that each species of bacteria isolated from shrimp produces its own pattern of spoilage in refrigerated shrimp. Increased levels of trimethylamine (TMA) are associated with quality deterioration and are considered to be due to bacterial modification of trimethylamine oxide (TMAO). The report of N. K. Velankar and T. K. Govindan ["Trimethylamine Oxide Content of Marine Prawns Occurring in the Back Waters and in the Sea Off Cochin," Proc. Indian Acad. Sci. 52B, 111-115 (1960)] indicated that the TMAO content of shrimp taken from brackish water was lower than in shrimp taken from salt water. The authors suggest that differences in the chemical and microbiological characteristics of the aquatic environment and of the shrimp taken from these areas could influence the shelf life of iced shrimp. A study was conducted to determine the changes, during iced storage, in chemical characteristics and bacterial counts of shrimp taken from different locations in the northwestern Gulf of Mexico.

The samples tested were from freshly harvested white shrimp taken in 13 locations in the Gulf of Mexico; freshly harvested brown shrimp taken from three different depths of water near Port Aransas, Texas; and brown shrimp taken from commercial fishing boats at the time of landing. Analyses were made on the samples

1.95 (9.125) FUNCTIONAL ANATOMY OF MARINE MAMMALS. VOLUME 1.

Harrison, R. J. (editor)
Academic Press, London (1972), xvi & 451 pp. £7.50.
Aquatic Sciences & Fisheries Abstracts 3, No. 8, 55, Abstract No. 3Q8303M (Aug. 1973)

This book contains articles by specialists on the growth and development of marine mammals; observations on seal skulls; comparative anatomy of the whale, dolphin, and porpoise; observations on the eye of the seal and walrus; anatomy of the seal ear; underwater hearing in seals--functional morphology; comparative anatomy of the hind limbs of the river otter, sea otter, and seals; and reproduction and gonadal appearances of toothed whales. SW

1.959 (9.15) VENOM OF THE YELLOW-BELLIED SEA SNAKE (PELAMIS PLATURUS). PHYSICAL AND CHEMICAL PROPERTIES

Shipman, W. H., and G. V. Pickwell (Nav. Undersea Cent., San Diego, Calif.)
Chemical Abstracts 79, No. 15, 89749c (Oct. 15, 1973)

0.6 (9.2)(9.6) A GUIDE TO PRACTICAL TECHNOLOGICAL FORECASTING

Bright, James R., and Milton E. F. Schoeman (editors)
Prentice-Hall Inc., Englewood Cliffs, N.J. (n.d.), 651 pp. Price $49.95.

The purpose of this book is to bring together new information on technological forecasting flowing from industry, government, and academia during the last 5 years. It contains contributions from more than 40 experts in the field. The book is divided into five parts: (1) Toward Improvement of Technological Forecasting, (2) Advances in Technological Forecasting Techniques, (3) Technological Forecasting Applied to Current Problems, (4) Expanding the Scope of Technological Forecasting, and (5) Organizing for Technological Forecasting. The book contains discussions of several new forecasting theories and concepts, and it includes a number of actual forecasts to show what can be done with forecasting techniques. FTP

0.8 (3.2344) NON-STEADY HEAT TRANSFER IN A FREEZING MODEL SUBSTANCE

Geuze, C. A., and A. Betten (Touber, S., Grenco N. V., 's-Hertogenbosch, Netherlands)
Chemical Abstracts 78, No. 26, 161396j (July 2, 1973)

2.00 (1.85)

for amino nitrogen (AA-N), ammonia, total volatile nitrogen (TVN), trimethylamine nitrogen (TMN), bacterial count, and pH. Of the samples that were placed on sterile ice, spoilage odors were sensed: after 11 to 15 days in white shrimp, after 20 to 30 days in brown shrimp, and after 0 to 15 days in brown shrimp from commercial fishing boats (boat-shrimp). TVN and AA-N varied from sample to sample and did not show a consistent pattern of change during iced storage. Most of the TVN consisted of ammonia nitrogen. The TVN/AA-N ratios increased as the samples spoiled. The pH of the spoiled samples was relatively high, 7.8-8.0. The bacterial counts of fresh shrimp were not above 10,000/g. Nine of ten boat-shrimp samples had counts in excess of 1 million/g. The authors estimated that the maximum potential shelf life of boat-shrimp was reduced 0 to 15 days by contamination during handling and storage.
[6 tables, 9 references] SW

2.1126 (2.1476) COMPARISON OF SALMON CATCHES IN MONO- AND MULTIFILAMENT GILL NETS

Washington, Percy (National Marine Fisheries Service, NOAA, Northwest Fisheries Center, Seattle, WA 98102)
Marine Fisheries Review 35, No. 8, 13-17 (Aug. 1973)

Mono- and multifilament gill nets of the same mesh sizes were comparatively fished from the RV George B. Kelez for Pacific salmon, Oncorhynchus spp., and steelhead trout, Salmo gairdneri, in the Gulf of Alaska and North Pacific Ocean during the winter, spring, and summer of 1971. Catches were analyzed by catch per unit of effort (CPUE), species composition, and length composition of the fish. Relative efficiencies of mono- and multifilament gill nets varied considerably by season, species, and mesh size, but monofilament gill nets were generally more efficient with the CPUE 2.2 times that of multifilament nets. The species composition of salmon catches in mono- and multifilament gill nets in spring and summer were different owing to a higher percentage in multifilament nets of chum salmon, O. keta, in spring and of chum and coho salmon, O. kisutch, in summer. Means and/or variances of length were, in general, statistically different; monofilament-caught fish were generally slightly larger.
[3 figures, 4 tables, 5 references] Author's abstract

2.01 (1.4) IDENTIFICATION OF THE VOLATILE COMPOUNDS PRODUCED IN STERILE FISH MUSCLE (SEBASTES MELANOPS) BY PSEUDOMONAS FRAGI

Miller, A., III, R. A. Scanlan, J. S. Lee, and L. M. Libbey (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Applied Microbiology 25, No. 6, 952-955 (June 1973)

Earlier workers reported a fruity or esterlike odor that commonly developed in chilled fish muscle during the early stages of spoilage. The same odor was produced in sterile fish tissue by bacterial cultures isolated from fish. The isolate was identified as P. fragi, a psychrophilic organism which can use a variety of amino acids in odor production. An investigation was performed to identify the volatile compounds (including those responsible for the fruity odor) produced by P. fragi in black rockfish muscle.

Sterile fish muscle tissue was homogenized and inoculated with P. fragi strain 18. The sterile homogenate was also supplemented with 0.2% ethanol and inoculated. All samples were incubated at 5°, 15°, and 25° C and checked for odor periodically. When the fruity odor was pronounced, the homogenates were analyzed by combined gas-liquid chromatography and mass spectrometry. The fruity odor was produced in fish muscle at all incubation temperatures. It developed more rapidly at 25° C and was gradually superseded by a sulfide odor. No typical amine odor was apparent. In fish homogenate supplemented with ethanol and incubated at 15° C, the volatile compounds were methyl mercaptan, dimethyl sulfide, acetaldehyde, ethyl acetate, ethanol, ethyl butyrate, butanone, dimethyl sulfide, and ethyl hexanoate. The fruity odor was attributed to a synergistic flavor interaction involving ethyl acetate, ethyl butyrate, and ethyl hexanoate. The strong sulfide odor that was increasingly

2.03 (0.38) ACTIVITY OF MUSCULAR CATHEPSINS OF SOME MARINE FISHES

Fik, Mirosław (Institute of Fish Processing Technology)
Acta Ichthyologica et Piscatoria 2, No. 2, 105-110 (1972) (Szczecin, Poland)

Endogenous proteolytic enzymes may play an important role in the decomposition of fish. In this study, therefore, the author examined the activity of the muscle cathepsins of seven species of marine fish. The species used were cod, plaice, mackerel colias, hake, jackfish, brill, and herring. The enzyme was extracted from the fish muscle with 1% KCl. The activity of the cathepsins was determined by Anson's method [H. U. Bergmeyer, Methods of Enzymatic Analysis, Academic Press, New York (1965)] as modified by the author.

Of the fish from the Baltic Sea (cod, herring, plaice, brill), the muscle of the brill contained the most active cathepsin. Of the fish from the West African fishing grounds (hake, jackfish, mackerel colias), the muscle of the hake had the most active cathepsin. The cathepsins of the pelagic fish were less active than those of the fish from deeper waters.
[3 tables, 10 references] FTP

2.05 (0.5)(1.81) SURVIVAL OF VIBRIO PARAHAEMOLYTICUS IN OYSTER SHELLSTOCK AT TWO DIFFERENT STORAGE TEMPERATURES

Johnson, W. G., Jr., A. C. Salinger, and W. C. King (Maryland State Department of Health and Mental Hygiene, Baltimore, MD 21218)
Applied Microbiology 26, No. 1, 122-123 (July 1973)

A study was performed to determine the survival of V. parahaemolyticus in oyster shellstock (Crassostrea virginica) taken from an inlet, Fishing Bay, of Chesapeake Bay. Within 4 h of harvest, the oysters were divided into three lots: one lot was examined immediately, one was held at 35° C, and one was stored at 4° C. In the procedure to isolate the microorganism, the oysters and their liquor were blended with sterile 1% Trypticase soy broth (TSB) containing 3% NaCl. Serial tenfold dilutions were made to a concentration of 10^{-6} using as a diluent 1% TSB containing 3% NaCl. The dilutions and inoculated plates of thiosulfate-citrate-bile salt-sucrose agar were incubated at 35° C for 24 h. The colony isolates were tested by the methods of M. Fishbein, I. Mehlman, and J. Pitcher [Appl. Microbiol. 20, 176-178 (1970)] and the Food and Drug Administration [Bacteriological Analytical Methods, Washington, D.C. (1969)].

V. parahaemolyticus was found in the oysters harvested in January, February, April, May, September, and October. In the oysters held at 4° C, the microorganism survived for 3 weeks with no decrease in numbers; growth occurred for 2 to 3 days when the oyster samples were held at 35° C. In the lower dilutions, loss of V. parahaemolyticus occurred when other organisms were present in large numbers.
[2 tables, 8 references] SW

2.1 NOON SIGHT NAVIGATION; SIMPLIFIED CELESTIAL

Birney, Arthur A.
Cornell Maritime Press, Cambridge, Md (1972), 48 pp. Price $3.00.

This booklet is intended for a reasonably experienced skipper who has not learned complete celestial navigation. In the event of the navigator's sudden incapacitation, the procedures described in the booklet will bring both ship and crew back safely to port. The advantages of the system are simplicity and speed. Its major fault is that it can be used only one time during the day, at local apparent noon, when the sun is at its highest. If the sun or the horizon are obscured at that moment, the opportunity for a noon sighting is lost until the next day. SW

2.03 (0.38) OPTIMAL CONDITIONS FOR AUTOLYSIS OF JACK FISH MUSCLES TRACHURUS TRACHURUS (L.)

Fik, Mirosław (Institute of Fish Processing Technology)
Acta Ichthyologica et Piscatoria 2, No. 2, 113-118 (1972) (Szczecin, Poland)

In this study, the author examined the rate of autolysis of jackfish muscle under various pH and temperature conditions. The pH levels tested were 3.6, 4.0, 4.4, 4.8, and 5.2. The incubation temperatures used were 0°, 10°, 20°, 30°, 40°, and 50° C. The degree of autolysis was estimated by the increase in amino nitrogen as determined by formalin titration. The results indicated that the autolytic decomposition of jackfish muscle is most intense at pH 3.6-4.4 and at a temperature of about 40° C.
[2 figures, 3 tables, 6 references] FTP

2.1 (1.951) CRACKERS A DETERRENT FOR SEALS

Anonymous
S. Afr. Shipp. News. Ind. Rev. 27, No. 11, 47-49 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 8, 219, Abstract No. 3Q9118M (Aug.1973)

Experiments were performed in the use of firecrackers to drive seals away from purse seine catches. The results show that when the firecrackers were exploded underwater the seals left the nets but returned in a few minutes. The seals did not appear to become accustomed to the crackers. If the pursing operation takes 15 to 20 min, it would require about five crackers to repel seals during pursing. The crackers could also be used to control fish movement. Recordings of crackers could be used to drive off seals but not disturb the shoal fish. SW

2.01 (1.4)

evolved during continued incubation was identified as a combination of methyl mercaptan, dimethyl sulfide, and dimethyl disulfide. The bacterial culture used in this experiment was obtained from the Torry Research Station, Aberden, Scotland. A strain of P. fragi, obtained from Oregon State University and inoculated into fish muscle, was unable to produce fruity odors. The authors suggest that strong, fruity odors are characteristic of new isolates of P. fragi, but the ability to produce esters is easily lost by continued subculturing. P. fragi strain 18 inoculated into sterile, homogenized milk supplemented with 0.2% ethanol also produced a fruity aroma. The compounds responsible for the aroma were identified as ethyl butyrate and ethyl hexanoate. The authors suggest that the kinds and quantities of esters produced by the organism can be influenced by the substrate. The data indicate that P. fragi is responsible for fruity odor spoilage of fish and dairy products.
[1 figure, 1 table, 17 references] SW

2.19 (1.2) [PRESERVATION OF ANCHOVY ON BOARD THE FISHING VESSELS CAUGHT FOR FISH MEAL INDUSTRY] PRESERVACIÓN DE LA ANCHOVETA A BORDO DE LAS EMBARCACIONES PESQUERAS, CON FINES INDUSTRIALES DE REDUCCIÓN

Lam, R. C., E. C. Icochea, and J. T. Sãnchez (Inst. Mar., Callao, Peru)
Documenta. Organo Inf. Tech.-Cient. Minist. Pesq., Peru 2, No. 15, 36-47 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 6, 242, Abstract No. 3Q6787M (June 1973)

There is an 11% weight loss in the catch of fishmeal anchoveta after they are landed. The loss is caused by blood decomposition. The loss occurs mainly at factory warehouses, and it is significant because the total annual catch is 8 to 9 million tons. An investigation was carried out to determine methods of preserving the catch on the fishing boats. Preservation compounds were found to preserve the fish in the following order of effectiveness: 250 g $NaNO_2$ + 1 liter 37% formalin per ton of fish; modified INH solution (a proprietary liquid of unstated composition) 2 liter per ton of fish; 200 g $NaNO_2$ + 0.87 liter formaldehyde per ton of fish; and Na benzoate plus formaldehyde (250 p/m and 400 p/m, respectively). Further studies are needed in the industrial application of this information. SW

2.05 GROWTH AND TOXIN PRODUCTION OF CLOSTRIDIUM BOTULINUM TYPE E IN FISH PRODUCTS. IV. EFFECT OF FISH EXTRACTS ON SPORE GERMINATION

Ando, Yoshiaki, Shigemi Oka, and Keiichi Oishi (Hokkaido Inst. Public Health, Japan)
Chemical Abstracts 79, No. 15, 89274u (Oct. 15, 1973)

2.113 LEACHING MECHANISM OF CUPROUS OXIDE FROM ANTIFOULING PAINTS

De la Court, F. H., and H. J. De Vries (Paint Res. Inst., TNO, Delft, Netherlands)
Chemical Abstracts 79, No. 16, 93506p (Oct. 22, 1973)

2.113 ALKYLDITHIOCARBONATES AS ANTIFOULING AGENTS

Sugiyama, Hironari, Koyata Nitta, Kenji Matsunari, and Kiyoshi Takita (Kumiai Chemical Industry Co., Ltd.) (pat.)
Japan. Kokai 73 35,031 (May 23, 1973)
Chemical Abstracts 79, No. 15, 87971v (Oct. 15, 1973)

2.119 SHIPWRECK AND SURVIVAL

Miles, S. (University of Manchester, Manchester, United Kingdom)
Proc. R. Soc. Edinb. B, No. 73, 97-102 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 8, 5, Abstract No. 3Q8061 (Aug. 1973)

The factors concerned with survival after shipwreck include: the actual moment of crisis; abandoning ship; death by drowning, hypothermia, or sharkbite; and the influences of thirst, hunger, and exposure on survival in a life boat or raft.
SW

2.113 GRAPHITE

Spatzek, Heinz (Graphitbergbau Kaisersberg, Kaiserberg, Germany)
Chemical Abstracts 79, No. 16, 93505n (Oct. 22, 1973)

2.114 MAINTENANCE OF SMALL MARINE ENGINES

Cuttell, A. O. (Lister Blackstone Pty., Ltd., Revesby, New South Wales, Australia)
Australian Fisheries 32, No. 6, 30-31 (June 1973)

This article lists the tasks, as a general guide for operators, in the maintenance of small marine diesel engines. The engine manufacturer's instruction manual should be preserved in such a manner as to remain readable for providing instructions specific to a particular engine.

In daily maintenance--check fuel supply and condition and level of oil in engine, gearbox, and reduction gearbox, if fitted. Check levels of fluid in hydraulic-powered equipment. Check water level in header tank of heat exchanger. Wipe engine over with a clean cotton rag.

Every 100 h--examine and clean, if necessary, the air cleaner; check all fuel and oil lines for leaks; check battery terminals and acid level.

Every 250 h--remove lubricating oil and refill; remove injectors, if necessary, for cleaning and resetting; check auxiliary drive belts and check tension; check gearbox for leaks and tighten bolts, if necessary.

Every 500 h--adjust tappet clearances; wash engine down with clean fuel oil or kerosene; renew lubricating oil filter; lubricate generator bearing; remove cylinder heads and decarbonize, if necessary; clean inlet and exhaust manifolds; reinstall heads correctly.

Every 1,000 h--renew air cleaner elements; clean heat exchanger, if fitted; if air cooled, clean cooling fins, fan, and oil cooler; check raw-water impeller; check tailshaft alignment; replace oil in gearboxes.

2.1474 (2.1471) RESULTS OF COMPARATIVE TRAWL AND TRAP FISHING OFF OREGON FOR SABLEFISH, ANOPLOPOMA FIMBRIA

Parks, Norman B. (Northwest Fisheries Center, National Marine Fisheries Service, NOAA, 2725 Montlake Boulevard East, Seattle, WA 98112)
Marine Fisheries Review 35, No. 9, 27-30 (Sept. 1973)

A comparison of catches taken in trawls and traps fished at the same time and location off northern Oregon indicated that the traps were more selective for sablefish. Moreover, the trap-caught sablefish averaged 5.2 inches longer than, and were twice as heavy as the trawl-caught sablefish (average fork length 21.0 inches, average weight 3.4 lb). The percentage of marketable sablefish (4 lb or heavier) in the trap catches was 93.3 percent, but only 57.2 percent in the trawl catches.
[2 figures, 3 tables, 6 references] Author's abstract

2.114

Every 1,500 h--drain and clean fuel tank; renew fuel filter; clean and adjust injector nozzles; check and adjust fuel pump timing; check governor linkage; check water spaces in cylinder blocks, cleaning sludge out, if necessary.

Every 3,000 h--check turbocharger bearings for wear; check cooling fan bearings for wear.

Every 6,000 h--check main bearings for wear; inspect camshaft bearings; renew valve springs; check output shaft bearings of gearboxes for end play; check propeller shaft alignment at the engine drive coupling.

By adhering to scheduled checks and renewals, long and trouble-free engine life will be ensured. SW

2.1478 (9.17) UNDERWATER OBSERVATIONS ON TRACKS OF DREDGES AND TRAWLS AND SOME EFFECTS OF DREDGING ON A SCALLOP GROUND

Caddy, J. F. (Dept. of the Environment, Fisheries Research Board of Canada, Biological Station, St. Andrews, New Brunswick, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 2, 173-180 (Feb. 1973)

Earlier work by the author and his colleague indicated that tracks made by clam dredges may persist for several days on sand and for longer periods on mud. The author also showed that the scallop dredge has a low efficiency and may cause appreciable incidental mortalities of scallops that attract predators into the dredge tracks. In the present study, the author attempted to quantify some of the incidental effects of fishing (dredging and trawling) over a scallop ground.

Using a submersible in Chaleur Bay (Gulf of St. Lawrence), the author saw tracks of three types of fishing gear (otter trawl, and inshore and offshore dredges) in the bottom sediments. Tracks left by earlier otter trawling covered about 3% of the bottom area; the tracks were probably made by the trawl doors. Apparently, inshore and offshore scallop dredging appreciably roughens the bottom--fine sediments are lifted into suspension, gravel is buried below the sand surface, and large rocks embedded in the sediment are overturned. One design of inshore scallop dredge appears to be inefficient because it dumps its contents back onto the bottom at intervals during the tow. Dredging causes appreciable sublethal and lethal damage to the scallops left in the tracks. Incidental mortalities to scallops with an offshore dredge are about 13% to 17%. Predatory fish and shellfish appear in the dredge tracks within 1 h of fishing; the author found them present in densities of 3 to 30 times that outside the tracks.

[5 figures, 4 tables, 15 references] FTP

2.117 DEVELOPMENT AND PROPERTIES OF NONMAGNETIZABLE CORROSION-RESISTANT, AND SEA WATER STABLE STEELS WITH INCREASED 0.2% OFFSET YIELD STRENGTH. II. CORROSION PROPERTIES

Lennartz, Gustav, and Emil Michel (Forschungsinst., Dtsch. Edelstahlwerke A.-G., Krefeld, Germany)
Chemical Abstracts 79, No. 16, 95495h (Oct. 22, 1973)

2.113 BEHAVIOR OF ANTIFOULING PAINTS. V. EFFECT OF POISONS ON ALGAE AT THE WATERLINE

Rascio, Vicente J. D., and Ricardo O. Bastida (Dep. Anal. Ensayo Mater., Lab. Ensayo Mater. Invest. Technol., La Plata, Argentina)
Chemical Abstracts 79, No. 16, 93487h (Oct. 22, 1973)

2.113 ZINC-RICH ORGANIC SYSTEMS EXPOSED FIVE YEARS TO A MARINE ATMOSPHERE

Brouillette, Carl V. (Nav. Civ. Eng. Lab., Port Hueneme, Calif.)
Chemical Abstracts 79, No. 16, 93498n (Oct. 22, 1973)

2.114 (2.117) MANGANESE- AND ALUMINUM-CONTAINING BRONZE

Takahashi, Michio, Ichiji Nakano, and Takumi Sakai (Kobe Steel, Ltd., Japan) (pat.)
Japan 71 42,304 (Dec. 13, 1971)
Chemical Abstracts 79, No. 16, 95935b (Oct. 22, 1973)

2.114 (2.113) WATER SYSTEM OF BOILERS FED WITH SOFTENED SEA WATER

Makinskii, I. Z., K. M. Abdullaev, V. V. Shishchenko, and K. A. Bragina (Azerb. Inst. Nefti Khim. im. Azizbekova, Baku, U.S.S.R.)
Chemical Abstracts 79, No. 16, 96798w (Oct. 22, 1973)

2.3 CRAB PICKING MACHINE

Rodgers, Nellie H., William P. Hunt, and Richard T. Wenstrom (Hampton, Va.); Sea Savory, Inc. (Cambridge, Md.) (pat.)
U.S. Patent 3,750,234 (Aug. 7, 1973)

This crab picking machine has an endless, cleated conveyor belt that inclines upwardly. The cooked crabs are carried upwards to the discharge end and are dropped onto a perforated shaker screen. The impact of the fall breaks up the crab; the meat and waste fall through the screen onto another endless conveyor belt for sorting. The large pieces of crab then return to the elevator conveyor belt for another pass through the system. FTP

2.3 DYNAMIC SANITATION IN THE FISH AND SEAFOOD INDUSTRY
(3.18)

Pedraja, Rafael R. (Booth Fisheries Div., Consolidated Foods Corp., Chicago, IL 60606)
Food Technology 27, No. 10, 42, 44, 72 (Oct. 1973)

The food industry has been giving increasing attention to cleanliness and sanitation in manufacturing plants, handling of raw ingredients, and finished products. Four factors are involved in the increased interest in sanitation: consumer awareness in the area of food quality and safety, increasing activities of regulatory agencies in plant inspections, the food industry's own efforts to improve plant cleanliness and product quality, and the impact of professional food scientists on their companys' processing practices. In good plant sanitation bacteriologically acceptable products are handled in a hygienic manner in a satisfactory environment. Products made under these conditions result in repeat purchases by consumers and a secure market for the processor.

Sanitation requires complete and continuous involvement of management and plant personnel; it starts with physical surroundings (of a plant) and ends when the product is packed and stored. Sanitation encompasses the areas of: plant layout; raw ingredients; processing techniques; processing equipment; packaging; storage conditions; cleaning procedures; cleansing agents; pest control; microbiological testing; environmental control; sanitary inspections; personnel; supervision; personnel habits, training, and attitudes; and management understanding and support.

2.3 QUALITY AND STORAGE LIFE OF ICED TROUT
(2.4)(1.92)

Hansen, Poul (Technological Laboratory, Ministry of Fisheries, Technical University, 2800 Lyngby, Denmark)
Årsberetning fra Fiskeriministeriets Forsøgslaboratorium for 1972, København, Denmark)(1973), pp. 42-49.

Most of the trout produced in Danish trout farms are exported. Most exported trout are either iced or frozen. The storage life of iced trout is relatively short. An investigation was performed to assess the relative importance of fat oxidation, microbiological spoilage, and autolysis by muscle or gastric enzymes in the quality and storage life of iced trout.

Rainbow trout of about 200 g in weight were bled, gutted, and washed. The gutted trout were held for 1 min in a cold 0.5% aqueous solution of ascorbic acid. Except for controls, the fish were then vacuum packed in films of either polyethylene, polyamide or saran-coated polyester/polyamide laminate. The trout were buried in wet ice. At intervals of a few days, samples of trout wrapped in each of the packaging materials, and the controls, were given microbiological, chemical, and organoleptic analyses.

The results indicate that whole, ungutted trout stored on ice deteriorated in less than 1 week due to the action of visceral enzymes. Unwrapped, gutted trout showed rancidity within 1-1½ weeks. In this period, vacuum packed, gutted trout showed no or slowly developing rancidity depending upon the oxygen

2.6 MARKETING PRACTICES OF WHOLESALERS HANDLING FISH IN THE
(3.26)(3.337) AKRON AND CLEVELAND AREAS

Konopa, Leonard J. (College of Business Administration, Kent State University, Kent, OH 44242)
Marine Fisheries Review 35, No. 9, 31-37 (Sept. 1973)

The results of an exploratory survey in 1971 among seafood wholesalers in northeastern Ohio are reported. The most widely handled product was frozen fish; canned fish was the next product most widely handled. The seafood product handled the least by wholesalers was fresh fish; it was offered by 10 of the 13 major wholesalers but by only 1 of the 12 minor wholesalers. Two-thirds of the wholesalers handling fresh and frozen fish marked up the prices of these products equally while the other third marked up the price of fresh fish more than frozen fish. Domestically, Boston and Gloucester were the basic sources of finfish. The Gulf Coast States provided mostly shellfish. California and Washington were the primary sources of canned fish. Canadian sources supplied the largest amount of fresh and frozen marine and freshwater fish of foreign origin. Promotional methods used by the wholesalers were divided into four categories: inducements to resellers (special prices, display aids, other offers); pressure on salesmen and resellers (sales contests, commissions, telephone sales); other advertising forms (bulletins, flyers, yellow pages); and no promotion. Of the major line wholesalers, 23% engaged in no promotion. Major line wholesalers were equally divided in their preference for fresh or frozen fish; minor line wholesalers unanimously preferred frozen fish. The problems of the wholesalers included spoilage (of

2.3 (2.4)(1.92)

permeability of the packaging film. Tight packing, obtained by the vacuum treatment, keeps the belly flaps together and prevents rapid oxidation of these surfaces. Vacuum packed trout was stored for 2 weeks without showing deterioration. Microbiological spoilage occurs in the third week of iced storage. The storage of trout may be extended to more than 3 weeks by the following treatment: an ascorbic acid dip, vacuum packing, and an irradiation dose of 50-200 krads. [4 figures, 4 tables, 2 references] SW

2.6 (3.26) (3.337)

fresh fish); high cost of labor in processing fish; inadequate supply, transportation, and poor quality of fresh fish; breakage of packages; and inadvertently thawed frozen fish. Lack of consumer demand was the prime reason given by the wholesalers for not handling the underutilized species. While the wholesalers were willing to handle a species if they could realize a profit; they were reluctant to popularize the underutilized species (which would make them profitable). [1 illustration, 5 tables] SW

2.3 [BEHAVIOUR AND PRACTICAL EVALUATION OF FRYING FATS]
VERHALTEN UND BEURTEILUNG VON FRITIERFETTEN IN DER PRAXIS

Zeddelmann, H., and J. Wurziger (499¼ Fr. Oldendorf, Vortelia Inst., Federal Republic of Germany)
Fette Seifen, Anstrichmittel 75, No. 1, 18-24 (1973) (In German)
Food Science and Technology Abstracts 5, No. 6, 110, Abstract No. 6N265 (June 1973)

Oils rich in polyenoic acids and animal fats are unsuitable for prolonged use in frying. A new rapid test (the Fritest) to determine the degree of oxidative deterioration in frying-plant oils is described. FTP

2.3 CUTTLEFISH PROCESSING

Daiwa Kasei KK (pat.)
Japanese Patent 7302200
Food Technology 27, No. 9, 114 (Sept. 1973)

Enzymes are used to separate skin and membranes from cuttlefish meat. FTP

2.3 (3.18)

In preserving freshness of seafood, three factors must be considered in retarding undesirable changes during handling and processing: time, temperature, and cleanliness. The raw materials must be handled and processed as rapidly as possible from the time of capture until they are packed and stored. The recommended temperature during all operations, until final preservation is accomplished, is a maximum of 40° F. Strict sanitary rules must be followed to avoid contamination from sources external to the food product and to minimize growth of bacteria already present. A good plant manager must understand the significance of total plate counts, the presence of E. coli, Salmonella, botulism, and sanitation and quality as he understands statements of profit and loss, return on investment, production rates and efficiency standards. Quality assurance programs can act in a truly functional manner when they are separated from production directives, but quality assurance and production should work together in harmony for achieving the company goals of a profitable enterprise and good-quality products. [2 references] SW

2.3 CUTTLEFISH-CHEESE PRODUCT

Horii, J. (pat.)
Japanese Patent 7302336
Food Technology 27, No. 9, 114 (Sept. 1973)

Skinned cuttlefish flesh is soaked in seasoned liquid containing α-starch, stretched, and then rolled to form a sheet. Cheese is spread between two of the sheets, and the product is then press heated and cut. FTP

2.9 FORMATION OF NITROSAMINES IN A MEAT CURING MIXTURE

Sen, N. P., W. F. Miles, Barbara Donaldson, T. Panalaks, and J. R. Iyengar (Food Research Laboratories, Health Protection Branch, Ottawa K1A OL2, Canada)
Nature 245, No. 5420, 104-105 (Sept. 14, 1973)

Trace amounts of N-nitrosamines (carcinogens) have been found in certain foods, particularly nitrite-treated meat and fish products. These compounds may be formed by reaction of nitrite and secondary or tertiary amines. W. Fiddler, J. W. Pensabene, R. C. Doerr, and A. E. Wasserman [Nature 236, 307 (1972)] demonstrated that certain naturally occurring quaternary ammonium compounds can also react with nitrite to form nitrosamines. Dimethylnitrosamine (DMN) and nitrosopyrrolidine (NPy) have most frequently been found in cured meat products. During a monitoring survey of meats, the researchers noted a consistent occurrence of fairly high levels of NPy in Mettwurst sausage made by certain packers; this was the first reported instance of NPy in sausage. Through a series of appropriately designed experiments, they found that only sausages prepared with the packers' curing mixture contained NPy; sausages prepared without their curing mixture were negative for this compound. Their curing mixture was heavily contaminated with NPy and another nitrosamine, nitrosopiperidine (NPi).

The curing mixture was a dry powder of spices (black pepper, paprika, and two others), salt, sodium nitrite, and sodium nitrate. Further tests showed that both the black pepper and paprika could react with nitrite to form NPy and NPi. Black pepper predominantly formed NPi, and paprika formed mainly NPy. No nitrosamines were found when the mixtures were analyzed immediately after combining the spices.

3.12 (3.2345) THE HYDROLYSIS OF SODIUM TRIPHOSPHATE IN COD AND BEEF MUSCLE

Sutton, A. H. (Unilever Research Laboratory, Greyhope Rd., Aberdeen, Scotland)
Journal of Food Technology 8, No. 2, 185-195 (June 1973)

Polyphosphates may be used in meat and fish to reduce liquor losses during processing. Generally, sodium triphosphate (TP) and pyrophosphate (PP) are more effective than the orthophosphate (OP). Earlier published work seems to indicate that TP and higher molecular weight phosphates are hydrolyzed in the presence of beef and pork muscle. The purpose of the present study was to quantify the effect of sodium triphosphate in beef and cod muscle; P^{32} labeled TP was used to follow the fate of the molecule in the muscles. The muscle samples were dipped for 1 h at 0° C in phosphate solutions containing approximately 0.1M TP (actually, the distribution in the solution was about 80% TP and 20% PP). The dipped samples were drained, sealed in polythene bags, and stored at 0° C or 25° C. The muscle samples were analyzed for TP, PP, and OP at intervals of 0, 3, 6, 12, 24, and 72 h.

Rapid hydrolysis of triphosphate occurs in cod and beef muscle and the rate is approximately proportional to the total protein content. Furthermore, in the cod muscle, the pyrophosphate hydrolyzes equally rapidly, and, at 0° C, only the orthophosphate remains after 30-40 h. The pyrophosphate is more stable than the triphosphate in beef muscle at 0° C, but at 25° C the pyrophosphate disappears within 24 h. Apparently, the reaction of triphosphate and pyrophosphate with muscle to give increased water retention is an irreversible one.
[4 figures, 2 tables, 7 references, 2 appendixes] FTP

3.11 PRESERVING MIXTURE POLITSIKLIN USED TO PRESERVE FRESH FISH IN COOLED SEA WATER

Skvortsova, G. G., E. S. Domnina, G. N. Kurov, Yu. A. Mansurov, N. P. Glazkova, V. F. Sopochkin, and G. S. Lysenkova (Irkutsk Institute of Organic Chemistry) (pat.)
U.S.S.R. 379,254 (Apr. 20, 1973)
Chemical Abstracts 79, No. 13, 77202f (Oct. 1, 1973)

3.11 COMPOSITIONS CONTAINING FATTY ACIDS AND SORBIC ACID FOR FOOD PRESERVATION

Ueno, Ryuzo, Shigeo Inamine, Toshio Matsuda, and Tatsuo Kaneyama (Ueno Pharmaceutical Applied Research Laboratory) (pat.)
Japan. Kokai 73 28,628 (Apr. 16, 1973)
Chemical Abstracts 79, No. 4, 64838t (Sept. 17, 1973)

3.12 [APPLICATION OF ANTIBIOTICS IN THE FOOD INDUSTRY]

Tomas, B. (Intendantski Inst. JNA, Beograd, Yugoslavia)
Tehnologija Mesa 13, No. 11, 306-313 (1972) (In Serbo-Croat)
Food Science and Technology Abstracts 5, No. 8, 266, Abstract No. 8T425 (Aug. 1973)

Antibiotics are used for preservation of poultry, meat, and fish. Methods of applying the antibiotics include spraying on food, soaking the food in an antibiotic solution, incorporation into minced meat, and wrapping material made of an antibiotic treated cellophane. Fresh milk is not preserved with antibiotics. The use of antibiotics as an auxiliary step in canning operations improves the quality of the food because sterilization temperature and time can be reduced. SW

3.12 USE OF ANTIBIOTICS IN THE PRESERVATION OF PRAWN
(1.85)

Surendran, P. K., and Mahadeva K. Iyer (Cent. Inst. Fish. Technol., Ernakulam, India)
Chemical Abstracts 79, No. 5, 30568q (Aug. 6, 1973)

3.15 EXTENSION OF SHELF-LIFE OF INDIAN MACKEREL (RASTRELLIGER KANAGURTA) BY IRRADIATION

Venugopal, V., K. A. Savagaon, U. S. Kumta, and A. Sreenivasan (Biochemistry and Food Technology Division, Bhabha Atomic Research Centre, Trombay, Bombay 85, India)
Journal of the Fisheries Research Board of Canada 30, No. 2, 305-309 (Feb. 1973)

An optimum dose of 150 krad extended the chilled (0°-2° C) shelf-life of fresh dressed Indian mackerel to 25-30 days; under the same conditions, the shelf-life of unirradiated fish was 10-12 days. When the irradiated mackerel were vacuum packed in cellophane film, the fish tended to exude muscle fluids during storage. Fish stored in ice more than 5 days before the irradiation treatment showed reduced chilled storage life after irradiation.
[4 figures, 2 tables, 19 references] FTP

2.9

Probably the piperidine, pyrrolidine, or their precursors in these spices can react with nitrite to form NPy and NPi.

NPy and NPi are carcinogenic to laboratory animals, but there is yet no direct evidence of their carcinogenic effect in man. Nevertheless, the authors suggest that the practice of premixing certain species with nitrite in meat curing mixtures may be hazardous due to the formation of nitrosamines.
[3 tables, 11 references] FTP

3.12 POLYPHOSPHATES AND FISH: SOME CHEMICAL STUDIES
(3.2345)

Gibson, D. M., and C. K. Murray (Torry Research Station, 135 Abbey Road, Aberdeen, Scotland)
Journal of Food Technology 8, No. 2, 197-204 (June 1973)

Polyphosphates are used for treating fish to minimize drip in the frozen fishery products and to reduce loss of weight on cooking. Sodium tripolyphosphate and sodium pyrophosphate appears to be the most useful of the condensed phosphates for the purpose. The purpose of this study was to determine how much polyphosphate was taken up by treated fish and to determine the suitability of some commercial polyphosphate mixtures. Seven species of fish were tested (cod, haddock, plaice, lemon sole, redfish, hake, and saithe). Six proprietary mixtures of polyphosphates were examined. The fish were filleted and portions of the fillets were dipped into the polyphosphate solution (5% sodium tripolyphosphate plus 5% sodium hexametaphosphate). The dipped portions were drained, packed into polypropylene/polyethylene pouches, and then stored at 1°-3° C. Phosphorus assays were made on both the treated and untreated fish muscle. The proprietary mixtures were analyzed by thin-layer chromatography.

The researchers found that the fish-to-fish variation in natural phosphorus content was so large that it was not possible (by the methods used) to determine whether or not the fish had been treated with polyphosphate. The amount of polyphosphate taken up under the conditions of the test was equivalent to 50-100 mg P per 100 g of fish muscle.

Several of the commercial mixtures of polyphosphates showed a high proportion of sodium tripolyphosphate and sodium pyrophosphate.
[2 figures, 3 tables, 16 references] FTP

3.234 ORGANOLEPTIC ASSESSMENT OF PRODUCTS FROZEN BY TWO METHODS: LIQUID NITROGEN AND BLAST FREEZING

Hill, Margaret A., and G. Glew (Catering Research Unit, Procter Dept. of Food and Leather Science, Leeds University, Leeds LS2 9JT, England)
Journal of Food Technology 8, No. 2, 205-210 (June 1973)

Macaroni cheese, poached codfish, carrots, and coq au vin (chicken legs in a sauce) were prepared, and then samples of each, packaged in polyethylene freezing molds, were frozen in liquid nitrogen (-10° C) or in a blast freezer (-25° C). The frozen food was sealed in a polyethylene bag and stored at -18° to 22° C for 3-18 days or more than 6 weeks. The products were reheated and rated organoleptically by a panel of judges.

The food products frozen by the two methods were not significantly different, with the exception of macaroni cheese. After 6 weeks of storage, the macaroni cheese product frozen by liquid nitrogen showed significantly higher scores for flavor and texture than did the product frozen in a blast freezer. For the products tested, liquid nitrogen freezing of multiportion packs of cooked food products offers no appreciable advantage over freezing them in an efficient blast freezer, at least when the frozen product is stored only a short time.
[2 tables, 2 references] FTP

3.2495 EFFECT OF SEASON ON SALT-EXTRACTABLE PROTEIN IN MUSCLE FROM TRAWLER-CAUGHT COD AND ON ITS STABILITY DURING FROZEN STORAGE

Castell, C. H., and Doris M. Bishop (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 2, 157-160 (Feb. 1973)

Two hundred and seventy-two fillets from fresh cod that were caught during 10 months of a year were analyzed for the salt extractable protein and for lipid content of the muscle. Fillets from the same lots of fish were frozen and placed in storage at -3.3°, -12°, and -26° C. At periodic intervals, salt extractable protein determinations were made on the stored cod fillets. The salt extractable protein of the fresh cod fillet was slightly lower in those fish caught during the spring spawning period (March, April, and May); there was also a slight decrease in the lipid content of the muscle. The fillets of cod caught during the spring spawning period and stored at -3.3° and -12° C, deteriorated faster (as indicated by salt extractable protein values) than similar fillets of fish caught during the summer and fall and stored at the same temperatures. When the fillets were stored at -26° C for up to 2 years, the changes in the salt extractable protein values of the muscle were so minor that seasonal difference in storage quality could not be detected.
[3 figures, 16 references] FTP

3.237 IMPROVING THE SUPPLY OF MINCED BLOCKS FOR THE FISH STICK TRADE: A PROGRESS REPORT

King, Frederick J. (National Marine Fisheries Service, NOAA, Atlantic Fishery Products Technology Center, Emerson Ave., Gloucester, MA 01930)
Marine Fisheries Review 35, No. 8, 26-32 (Aug. 1973)

This paper, in the form of a progress report, describes the author's work on the development of frozen minced fish blocks from the meat obtained from "fish frames." The term fish frame refers to the backbone of a fish after the fillets have been removed. The backbone portion contains some adhering muscle, and it is this muscle meat that is separated from the backbone and used in the preparation of frozen minced fish blocks. The meat is separated from the bone by a mechanical meat-bone separator, which essentially minces the muscle tissue.

But, fish frames contain blood-rich tissue just under the backbone. This pigmented tissue gives the separated minced meat a reddish color, which is considered undesirable. The author describes various methods that help improve the color and appearance of the minced fish blocks. The last part of the report is a discussion of the quality evaluation of prepared frozen minced fish blocks. It also contains a copy of an inspection report form for evaluating minced fish blocks
[5 illustrations, 8 references] FTP

3.4 (1.92) A PROCEDURE FOR PROCESSING SMOKED CHANNEL CATFISH (ICTALURUS PUNCTATUS)

Boggess, T. S., Jr., E. K. Heaton, and L. R. Beuchat (Dept. of Food Science, University of Georgia Agricultural Experiment Station, Experiment, GA 30212)
Journal of Milk and Food Technology 36, No. 9, 469-473 (Sept. 1973)

Various procedures for smoking channel catfish were investigated. The effects on the quality of the product were evaluated after the following conditions in the procedures were varied: storage time before brining, fish size, brining time and formula, smoking time and temperature, and storage time after smoking. The most acceptable product was prepared by the following procedure. Catfish averaging 10.5 oz (dressed) were brined for 24 h at 40° F; the brined fish were subjected to smoking in which the internal flesh temperature was gradually increased from 90° to 140° F over a 22-h period, followed by an increase to 180° F over a 4-h period, and then held at this temperature for 30 min. Organoleptic evaluation of the finished product indicated that catfish smoked in this manner were as acceptable as smoked haddock and chubs. In the acceptable procedure, the use of a freshly dressed catfish produced a smoked product that was similar in quality to one prepared from frozen catfish. The acceptable brining mixture consisted of 72 lb of water containing 9 lb sugar, 9 lb sodium chloride, 0.23 oz potassium nitrate, and 0.23 oz sodium nitrate. The smoking step consisted of generating smoke from moist hickory wood chips in a thermostatically controlled smokehouse. The temperature of the chamber was gradually increased to produce the internal flesh temperatures that were optimal in preparing acceptable smoked catfish. According

3.235 [FISH PRODUCT]
(3.4)

Unilever NV (pat.)
Netherlands Patent Application 7,206,554 (1972) (In Dutch)
Food Science and Technology Abstracts 5, No. 6, 152, Abstract No. 6R262 (June 1973)

Raw fillets of coal fish, trout, or salmon are treated with salt to give a salt content of 3-10%. The salted fillets are then coated with a mixture of commercial fish flesh, salt, and edible inorganic phosphate. The fillets are then formed and frozen in blocks. Portions cut from the blocks are then smoked in the frozen state. FTP

3.4 (1.92)

to P. J. Pace and E. R. Krumbiegel ["Clostridium botulinum and Smoked Fish Production: 1963-1972," J. Milk Food Technol. 36, 42-49 (1973)], fish must be removed from the smoking chamber to a separate room for prompt cooling. After cooling, the fish must be packaged within 2 h after completion of smoking; the packages must bear the words "Perishable-Keep Refrigerated"; the package must not be sealed to allow exchange of air; the package must bear the processing date and expiration date; the smoked fish must be maintained at a refrigeration temperature of no more than 40° F (4.5° C) from the time of packaging, during transportation, and during display; and the expiration date must be 7 days following the date of smoking. If these rules are followed the safety and organoleptic properties of smoked catfish will be preserved.
[3 tables, 11 references] SW

3.4 PHENOL AND FORMALDEHYDE CONTENTS IN SMOKED FOODS
(8.59)
Cantoni, C., I. Dragoni, and V. L'Acqua (Ist. Ispezione Alimenti. Origine Anim., Univ. Milano, Milan, Italy)
Chemical Abstracts 79, No. 4, 64702u (Sept. 17, 1973)

3.27 [THAWING OF DEEP-FROZEN FOODS IN VACUO]
DAS AUFTAUEN TIEFGEFRORENER NAHRUNGSMITTEL IM VAKUUM

Everington, D. W. (APV Clarke-Built Ltd., Stephenson Way, Thetford, Norfolk, United Kingdom), and A. Copper
Allgemeine Fischwirtschaftszeitung 25, No. 5, 21-23 (1973) (In German)
Food Science and Technology Abstracts 5, No. 6, 151, Abstract No. 6R260 (June 1973)

The system for vacuum thawing frozen foods developed jointly by the Torry Research Station, Aberdeen, Scotland, and a commercial firm is described. The system is based on the transfer in a vacuum of the latent heat of vaporization of the fishery product. FTP

3.5 [THEORY OF FISH MEAT RIPENING DURING SALTED FISH DRYING]

Bal', V. V. (Astakhanskii Tekh. Inst. Rybnoi Promyshlennosti i Khozyaistva, U.S.S.R.), and L. I. Khvalova
Izvestiya Vysshikh Uchebnyck Zavedenii, Pishchevaya Tekhnologiya No. 1, 74-76 (1972) (In Russian)
Food Science and Technology Abstracts 5, No. 6, 157, Abstract No. 6R288 (June 1973)

Caspian bream were used in this dry salt fish study. Curing of the dry salt bream involved three distinct but interlinked stages: (1) There was an increase in the tension of the surface of the muscle tissue due to the lowered water content; (2) a water-fat emulsion formed throughout the muscle tissue; and (3) amino-lipid compounds having special aromatic and flavor properties formed in the tissue. FTP

3.3 EFFECT OF THE TIME OF STORAGE ON THE ACIDITY OF FAT IN SOME CANNED FISH
(8.53)
Wierzchowski, J., B. Wituszynska, and R. Gajewska (Dep. Bromatol., Med. Acad. Gdansk, Gdansk, Poland)
Chemical Abstracts 79, No. 7, 41061v (Aug. 20, 1973)

3.3 RELATION BETWEEN THE QUALITY OF CANNED FISH AND ITS CONTENT OF ATP-BREAKDOWN. III. ATP-BREAKDOWNS IN CANNED ALBACORE AND SKIPJACK IN RELATION TO THE ORGANOLEPTIC INSPECTION
(8.8)
Fujii, Yutaka, Katsuo Shudo, Kunisuke Nakamura, Senji Ishikawa, and Minoru Okada (Tokai Reg. Fish. Res. Lab., Tokyo, Japan)
Chemical Abstracts 78, No. 13, 83014s (Apr. 2, 1973)

3.9 (0.6) FISH EXTENDER STRETCHES FROZEN SEAFOOD PROFITS

Anonymous
Quick Frozen Foods 36, No. 3, 29 (Oct. 1973)

"SEAPRO" is the trade name of a new soy protein-based extender for seafood items. SEAPRO can be used to replace a portion of the fish in a seafood preparation without modifying its taste, texture, and general appearance. The product is available in 10-lb loaves 36 in long and 4 in in diameter. It can be stored indefinitely in a frozen state. Shelf life is 1 month under refrigeration and 1 week at room temperature. SEAPRO is white in color, and it has a bland flavor. It can withstand repeated freezing and thawing with no loss in quality. The product can be ground, cubed, chopped, or flaked to resemble various types of fish and crab meat. It has the following typical analysis: protein, 18.7%; fat, 16.7%; ash, 2.6%; and moisture, 61.7%. SEAPRO can be fortified by its manufacturer with vitamins and minerals to conform to U.S. Dept. of Agriculture Food and and Nutrition Service Notice 219 requirements for school lunch programs.
[2 photographs]
SW

4.13 DISTRIBUTION OF TRANS-6-HEXADECENOIC ACID, 7-METHYL-7-HEXADECENOIC ACID AND COMMON FATTY ACIDS IN LIPIDS OF THE OCEAN SUNFISH MOLA MOLA

Hooper, S. N., M. Paradis, and R. G. Ackman (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Lipids 8, No. 9, 509-516 (Sept. 1973)

Results of this study of the fatty acids in the lipids of ocean sunfish suggest that the sunfish obtains a major part of its sustenance from jellyfish and similar pelagic invertebrates. Two unusual fatty acids trans-6-hexadecenoic acid and 7-methyl-7-hexadecenoic acid, were found in the sunfish lipid, and they are considered to be of exogenous origin.
[3 tables, 27 references]
FTP

4.11 DETERMINATION OF FATTY ACID COMPOSITION BY GAS CHROMATOGRAPHY: I. ANALYSIS WITH USE OF THERMAL CONDUCTIVITY DETECTOR

Watanabe, S., S. Hayano, T. Akiya, K. Mimura, S. Nakasato, H. Seino, and Y. Usui (Japan Oil Chemists' Society Gas Chromatography Committee, Yushikogyokaikan 7F 3-13-11, Nihonbashi, Chuo-ku, Tokyo 103, Japan)
Journal of the American Oil Chemists' Society 50, No. 9, 357-359 (Sept. 1973)

In order to establish a standard method for the gas chromatographic determination of fatty acids, a study team consisting of representatives from industrial, independent government, and university laboratories carried out replicate analyses of specified samples. Gas chromatographs with thermal conductivity detector were used. Four standard samples consisting of mixtures of methyl laurate, methyl myristate, methyl palmitate, and methyl stearate were prepared and used in the collaborative tests. Results of four tests showed that interlaboratory scattering of data and deviation of analytical values from actual composition could be decreased by (1) enlarging the size of narrow peaks (less than 5 mm at half height) or peaks of low height by adjusting the attenuator range or chart speed and (2) adjusting the analytical values by use of correction factors determined from the analysis of known mixtures having compositions similar to those of the unknown sample.
[3 tables, 4 references]
FTP

4.5 REACTION OF AUTOXIDIZING LINOLEATE WITH COHO SALMON MYOSIN

Braddock, R. J., and L. R. Dugan, Jr. (Dept. of Food Science, Michigan State University, East Lansing, MI 48823)
Journal of the American Oil Chemists' Society 50, No. 9, 343-347 (Sept. 1973)

Earlier work has shown that the decomposition products of oxidized lipid in freeze-dried salmon probably reacted with the amino groups of the protein to produce browning. One reactive constituent produced from polyunsaturated fatty acid (PUFA) oxidation is malonaldehyde; it can participate in reactions involving free-amino groups of proteins and amino acids. Coho salmon contain significant proportions of oleic, linoleic, linolenic, and arachidonic acids; these acids produce malonaldehyde or malonaldehydelike products under oxidative conditions. However, carbonyl compounds other than malonaldehyde may possibly participate in protein-lipid oxidation product interactions. Malonaldehydelike products, in the presence of water, may exist as nonvolatile enolate ions and thus they can react with amino acids, proteins, glycogen, and other food constituents to produce a bound complex that is hydrolyzable by acid or heat. Browning of some food systems containing oxidizable lipids and proteins may also involve complex lipid-protein interactions and reactions involving other constituents. The present study gave new evidence that production of C=N compounds occurs as a result of reactions between autoxidation products of the PUFA and amino groups present in a biological system.

Model systems containing buffered solutions of sodium linoleate, coho salmon myosin, and sodium linoleate-myosin were permitted to oxidize at 50° C under an oxygen atmosphere. Fluorescent components, showing characteristic spectra, were extracted and isolated by thin-layer chromatography from the autoxidizing model

4.11 DETERMINATION OF FATTY ACID COMPOSITION BY GAS CHROMATOGRAPHY: II. ANALYSIS WITH USE OF FLAME IONIZATION DETECTOR

Watanabe, S., S. Nakasato, S. Hayano, H. Kuwamura, T. Nagai, M. Negishi, Y. Sasamoto, H. Seino, and S. Shiraishi
Journal of the American Oil Chemists' Society 50, No. 9, 360-363 (Sept. 1973)

In this collaborative study, mixtures of four or five fatty acid methyl esters (methyl laurate, methyl myristate, methyl palmitate, methyl stearate, and methyl elaidate) were analyzed by gas chromatography using flame ionization detectors. By applying correction factors (obtained by using mixtures of known concentrations) the data on the test samples showed less interlaboratory scattering and less deviation from the actual values. When a constant amount of sample was injected, intralaboratory scattering of data decreased, but interlaboratory scattering of data did not decrease. The authors recommend that 0.5-1.0 µl of a 20% solution of sample be injected.
[4 tables, 6 references] FTP

4.2 CHANGE IN LIPIDS IN MARBLED NOTOTHENIA DURING THE PRODUCTION OF CURED FISH FILLETS

Lapshin, I. I., and M. G. Shevchenko (Mosk. Inst. Nar. Khoz. im. Plekhanova, Moscow, U.S.S.R.)
Chemical Abstracts 79, No. 13, 77128m (Oct. 1, 1973)

4.5

systems and from freeze-dried salmon steaks and salmon kept frozen at -20° C for 1 year. At the beginning, TBA values and oxygen uptake of the autoxidizing systems showed rapid increases with time followed by a significant decrease in TBA values and slow leveling off of oxygen uptake on prolonged oxidation. Further analyses showed the presence of C=N functional groups in extracts from various samples. The control myosin solution allowed to oxidize without the addition of linoleate did not show these compounds. The myosin from the autoxidizing system showed significant decreases in the amounts of histidine, lysine, and methionine following oxidation as compared with the nonoxidized myosin-linoleate systems. Such reactions, the authors indicate, apparently contribute to the denaturation and destruction of the lipids and protein in the model system, and in the frozen or freeze-dried salmon product.
[5 figures, 1 table, 18 references] FTP

4.86 FATTY SUBSTANCE OF HIDE AND LEATHER. 11. COMPARISON OF PREPARING CONDITIONS OF SULFITED OIL AND ITS PROPERTIES

Shirai, Kunio, and Hiroshi Okamura (Yamazaki Chem. Lab., Saitama, Japan)
Chemical Abstracts 78, No. 8, 45088m (Feb. 26, 1973)

3.9 POSSIBLE SUBSTITUTES FOR NITRITE FOR PIGMENT FORMATION IN CURED MEAT PRODUCTS

Howard, Arlene, Patricia Duffy, Kathy Else, and W. Duane Brown (Institute of Marine Resources, Dept. of Food Science and Technology, University of California, Davis, CA 95616)
Journal of Agricultural and Food Chemistry 21, No. 5, 894-898 (Sept.-Oct. 1973)

Meat curing mixtures generally include salt, sugar, nitrate and/or nitrite, and often a reductant such as sodium ascorbate or sodium erythorbate. During the curing process nitrate and nitrite are reduced to nitric oxide, and the nitric oxide then binds with the heme pigments myoglobin and hemoglobin to form unstable bright red pigments, nitric oxide myoglobin and nitric oxide hemoglobin. A relatively stable pigment, denatured globin nitric oxide ferrohemochrome, is formed on heating. The use of nitrite in foods is currently being questioned, and proposals have been made to reduce the allowable sodium nitrite levels in finished food products from 200 to 10 or 20 p/m. The purpose of the present study was to examine various nitrogenous ligands for their ability to form pink pigments in models and cured meat systems.

Twenty-four nitrogenous ligands, at various concentrations, were tested for their ability to form ferrohemochromes with bovine myoglobin at pH 5.0 or 6.0. Methyl and hexyl nicotinate and N,N-diethylnicotinamide were particularly effective in this respect; they formed stable pink pigments in cooked ground meat mixtures. These three compounds and trigonelline in combination with 10 or 20 p/m of nitrite formed stable and long-lasting pink cured meat color in such systems.
[4 figures, 3 tables, 18 references] FTP

4.8 OILS AND FATS. IMPORTANT RAW MATERIAL SOURCE OF THE CHEMICAL INDUSTRY

Ploog, Uwe, and Guenter Reese (Henkel und Cie G.m.b.H., Dusseldorf, Germany)
Chemical Abstracts 79, No. 6, 32889u (Aug. 13, 1973)

4.83 ALKYD PAINT FOR TEXTURED COATINGS

Kitzler, Jaroslav, Karel Hajek, and Jiri Stanek (pat.)
Czech. 144,591 (July 15, 1972)
Chemical Abstracts 78, No. 2, 5512p (Jan. 15, 1973)

4.86
(6.86) EFFECT OF THE NATURE OF NUTRIENTS AND OTHER FACTORS ON PROPERTIES OF SEMIFINISHED COW HIDE. III. CHLOROSULFONATED OILS

Angelinetti, A. R., N. A. Lacour, and F. A. Luchese (La Plata, Argentina)
Chemical Abstracts 78, No. 26, 160928x (July 2, 1973)

6.134 DEHYDRATION EQUIPMENT
(6.34)(3.61)
(0.6)

McDonald, D. P.
Food Manufacture 48, No. 8, 37, 39, 41, 45, 54 (Aug. 1973)

In the economics of food preparation, continuous processing is an important requirement. In operations which cannot be continuous such as batch processing, modifications are adopted so that peripheral processing operations can be made continuous. The drying operation has been improved, and a variety of methods are available which can be integrated into continuous processing. This report is a survey of the drying equipment now available.

The conveyor dryer is the old style tray dryer made continuous. It can easily be cleaned, a necessity in the food industry. Variations of this equipment can be used either for flaked, granular, extruded, pelletized, and briqueted material, or for wet, pastelike material, or for continuously drying, toasting, and cooling bread crumbs and other dried bread products. The rotary dryer in its simplest form consists of a rotating cylinder fitted with internal projections which lift the material to be dried into a stream of hot gas. These dryers are used in the production of fish meal, semolina, sugar, alginates, chocolate crumb, and other meals and pulps. In the ring dryer, the material to be dried passes through a large ring-shaped duct while hot air passes through it. The advantages of this dryer are better control of final moisture content, and the capability of recycling the material through the ring if it is not uniformly dry. In spray drying, solutions

5.7 MODE OF ACTION OF SELENIUM AND VITAMIN E IN PREVENTION OF EXUDATIVE DIATHESIS IN CHICKS
(8.42)
(5.123)(0.7)

Noguchi, Tadashi, Austin H. Cantor, and Milton L. Scott (Dept. of Poultry Science and Graduate School of Nutrition, Cornell University, Ithaca, NY 14850)
Journal of Nutrition 103, No. 10, 1502-1511 (Oct. 1973)

Exudative diathesis (ED) in chicks is a severe edema characterized by accumulation of subcutaneous fluid. Other workers have demonstrated that the disease is completely prevented by either vitamin E or selenium. J. T. Rotruck, A. L. Pope, H. E. Ganther, and W. G. Hoekstra [J. Nutr. 102, 689 (1973)] reported that selenium participates in the activity of the glutathione peroxidase (GSHpx) of rat erythrocytes; in addition, Se is part of the GSHpx molecule. Using this information, the authors investigated the GSHpx levels of chick plasma, erythrocytes, and liver in the presence or absence of dietary Se. The effects of vitamin E were also studied in the liver mitochondrial and microsomal membranes of chicks in relation to Se.

A crystalline amino-acid diet that was very low in Se and vitamin E was fed chicks. GSHpx activities were determined on the liver, plasma, and erythrocytes of the chicks after 6, 8, and 11 days on the diet. The results show that the GSHpx level of chick plasma is directly related to the Se level in the diet and to the effectiveness of Se in the prevention of ED. Experiments on the mode of action of vitamin E were performed. The results show that vitamin E is incorporated into the hepatic mitochondrial and microsomal membranes of chicks. Both

6.15 INCISOR FLUOROSIS IN MICE FED FISH-PROTEIN CONCENTRATE
(0.7)

Kerley, Michael A. (Dep. Biol. Texas A and M Univ., College Station, Tex.)
Chemical Abstracts 79, No. 4, 64991n (Sept. 17, 1973)

5.7 (8.42)(5.123)(0.7)

vitamin E and Se were found to be necessary to protect these membranes from ascorbic acid-induced lipid peroxidation in vitro.

The results obtained from these experiments permitted the development of the hypothesis that the plasma GSHpx present when the diet contains Se prevents the peroxidation of the unsaturated lipids of the cellular membranes. When the diet is deficient in Se, vitamin E in the diet prevents a chain-reactive autoxidation of the membrane lipids. These modes of action protect the chick against ED. The authors conclude that vitamin E appears to neutralize the free radicals which would attack the membrane lipids to form lipid peroxides. Selenium, through GSHpx, acts by destroying any peroxides that are formed.
[12 figures, 1 table, 20 references] SW

6.13 AZEOTROPIC REMOVAL OF WATER-HYDROCARBON ALCOHOL MIXTURES FROM FISH PRESS CAKE

Meade, Thomas L. (pat.)
U.S. Patent 3,712,822 (Jan. 23, 1973)
Chemical Abstracts 78, No. 21, 134735n (May 28, 1973)

6.190 MILK SUBSTITUTE

Bouffault, Jean C. R. (Legoy, Maurice) (pat.)
Ger. Offen. 2,246,245
Chemical Abstracts 79, No. 3, 17227h (July 23, 1973)

6.197 UTILIZATION OF SOFT PHOSPHATE IN DIETS WITH AND WITHOUT FISH MEAL OR SUPPLEMENTAL CALCIUM PHOSPHATE

Christmas, R. B., B. L. Damron, and R. H. Harms (Exp. Stn., Gainesville, Fla.)
Chemical Abstracts 79, No. 9, 52062x (Sept. 3, 1973)

4.91 FATTY ACID COMPOSITION OF NEPHTYS INCISA AND YOLDIA LIMATULA

Farrington, John W., and James G. Quinn (Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02881), and Wayne R. Davis
Journal of the Fisheries Research Board of Canada 30, No. 2, 181-185 (Feb. 1973)

The fatty acid composition of marine organisms may be influenced by the environment and by the fatty acid composition of their diet. Thus, attempts to give average fatty acid composition of depot fats of marine organisms may be unrealistic. In this study, the researchers determined the fatty acid composition of an infaunal worm, Nephtys incisa, and the bivalve, Yoldia limatula, collected in Narragansett Bay, Rhode Island. Y. limatula contained 9% to 16% (based on total fatty acids) of an acid identified, tentatively as 22:2. The ratios of 18:1/18:0 and 18:1/20:1 fatty acids of the N. incisa from a polluted area in the bay were lower than the ratios of the corresponding acids from the organisms taken in relatively clean areas.
[1 figure, 4 tables, 10 references] FTP

4.9 (2.8) NUTRITIONAL-PHYSIOLOGICAL PROPERTIES OF FISH-FRYING OILS. 3. GEL PERMEATION CHROMATOGRAPHY OF FISH-FRYING OILS

Uhbehend, M., and H. Schaarmann. (Germany)
Chemical Abstracts 79, No. 4, 64754n (Sept. 17, 1973)

6.134 (6.34)(3.61)(0.6)

and slurries which can be reduced to a fine spray are subjected to flash evaporation. The material is atomized in a conical case, and hot air flowing through the material carries off the moisture. The dried material is collected outside of the drying chamber. This drying process is used in the production of dried coffee, whey, and fish protein concentrate. Fluid bed dryers are used for crystalline materials such as salt and dextrose and those materials which release water slowly. The screw conveyor/dryer is used where a material requires drying or cooling while it is conveyed to the next processing operation. The batch dryer is still used for such products as almonds, caramel, desiccated coconut, and other granular materials. It may still be in use in the preparation of fish meal. Drum dryers and pneumatic dryers were also described.
[10 figures] SW

6.133 SEPARATING FAT FROM ANIMAL MATERIAL

Hoffmann, W. (Alfa-Laval AB) (pat.)
Sweden 351,433 [Patent No. ?] (Nov. 27, 1972)
Chemical Abstracts 78, No. 26, 161166j (July 2, 1973)

6.195 A COLLABORATIVE STUDY ON THE DETERMINATION OF AVAILABLE LYSINE IN FEEDING STUFFS

Milner, C. K., and D. R. Westgarth (Shell Research Limited, Tunstall Laboratory, Broad Oak Road, Sittingbourne, Kent, England; and National Institute for Research in Dairying, Shinfield, Reading RG9 2AT, England)
Journal of the Science of Food and Agriculture 24, No. 8, 873-882 (Aug. 1973)

The available lysine value is used as an index of protein quality. Several methods for determining available lysine have been proposed, with the methods of K. J. Carpenter [Biochem. J. 77, 604 (1960)] and A. G. Roach, P. Sanderson, and D. R. Williams [J. Sci. Fed. Agric. 18, 274 (1967)] (the Silcock method) being used most frequently. In this study, the method of Carpenter and the Silcock method were compared in two collaborative trials involving eight laboratories. Fish meal and groundnut meal were used in the first trial; and soybean meal, sunflower meal, a commercial mixed feed, and wheat meal were used in the second trial.

There was no statistically significant difference between the two methods in terms of their overall mean values; however, for the mixed feed, the values by Carpenter's method tended to be lower. The standard deviations for available lysine obtained interlaboratory were numerically greater by Carpenter's method with each feeding stuff, but significance was only established with confidence in the case of the wheat meal.

The authors conclude that there is little difference between the two methods, although the Silcock method may be more precise. Both methods require experience and good laboratory practice.

[2 tables, 11 references] FTP

6.34 BENTHIC MARINE AND BLUE-GREEN ALGAL SPECIES AS A SOURCE OF CHOLINE

DaSilva, Edgar, and Arne Jensen (Norwegian Institute of Seaweed Research, 7034 Trondheim-NTH, Norway)
Journal of the Science of Food and Agriculture 24, No. 7, 855-861 (July 1973)

This work is part of a study of the systematic evaluation of seaweed meal as a feed additive. Although choline, free or combined, occurs in most all plant and animal tissues, little information is available on the choline content of seaweeds. In this study, species of red, brown, and green seaweeds and blue-green algae were analyzed for choline content. About one-third of the seaweeds and all of the blue-green algae showed very low choline content values. Of the remainder, the brown seaweeds showed levels of from 0.1 to 6 mg, the red from 1 to 6 mg, and the green from 3 to 8 mg choline per gram of dry material. The seasonal variations in choline content of three brown algae were also examined. Over a 17-month period one species showed higher choline values in the winter and spring and relative lower values in the summer and fall; another species fluctuated irregularly over the entire period; and the third species showed irregular fluctuations during the first 6 months and then showed fairly stable values for the rest of the test period. Six commercially produced seaweed meals prepared from Ascophyllum nodosum (brown algae) showed from 2.5 to 3.1 mg of choline per gram of meal (dry weight).

[1 figure, 4 tables, 13 references] FTP

6.31 (1.0114) KELP HABITAT IMPROVEMENT PROJECT COVERING THE PERIOD JULY 1, 1971 TO JUNE 30, 1972

North, Wheeler J.
Published by W. M. Keck Laboratory of Environmental Health Engineering, California Institute of Technology, Pasadena, Calif. (1973), ix + 200 pp.

Kelp is an important marine resource of California. Members of State government agencies, industrial organizations, recreational groups, and academic institutions have been concerned with the condition of the kelp beds. Persistent deterioration began about 1940 among kelp beds in southern California. Influences such as high temperatures contributed to the declining kelp beds. Studies undertaken between 1956 and 1962 indicated, in part, that vast numbers of sea urchins were grazing on the remains of several important kelp beds and destroying them. The absence of the sea otter, an important sea urchin predator, exacerbated the situation. Starting in 1962, studies were performed to determine whether sea urchin populations could be controlled. By applying information gained, a significant portion of the depleted kelp bed off Point Loma was restored by sea urchin control. Project personnel undertook kelp restoration at other locations on the coast of California.

This report is divided into nine chapters most of which describe restoration projects at various places on the coast. The remaining chapters cover urchin control, kelp culture, and the biology of the major kelp genus, Macrocystis.

[57 illustrations, 18 tables, 14 references] SW

6.51 AN INITIAL EVALUATION OF ETHYLENE OXIDE FOR THE STERILIZATION OF FORMULATED AND PELLETED FISH FEEDS

Trust, T. J., and A. J. Wood (Dept. of Bacteriology and Biochemistry, University of Victoria, Victoria, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 2, 269-274 (Feb. 1973)

Earlier work has indicated that commercial fish feeds contain a mixed microflora including bacterial species potentially harmful to man and fish. The nature and extent of the microflora are determined, in part, by the ingredients used in the feed. A reduction in the microflora of fish feeds would help lower the probability of feed-borne infection and help in the maintenance of sanitary conditions in hatcheries and rearing ponds. In this study, the effects of ethylene oxide treatment of pelleted dry feeds on their bacterial burden were determined, and the growth of juvenile rainbow trout fed the ethylene oxide treated feeds was evaluated.

Three different fish feeds and four commercial feedstuffs (bran, turkey grower pellets, duck grower pellets, and chick starter pellets) were tested. The pelleted feedstuffs were treated with ethylene oxide-carbon dioxide gas mixture (20:80). The original and treated feedstuffs were submitted to bacterial examination and to bioassay with rainbow trout.

There was a substantial reduction in the number of the various viable bacteria in the feeds after exposure to ethylene oxide for 1-3 h. Exposure of 6 to 12 h was sufficient to sterilize feedstuffs having an initial bacterial count of 10^3-10^5 cells.

6.31 MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. HIGHER PLANTS OF THE MARINE FRINGE

Moul, Edwin T. (Dept. of Botany, Nelson Biological Laboratories, Rutgers University, New Brunswick, NJ 08903; and Systematics-Ecology Program, Marine Biological Laboratory, Woods Hole, MA 02543)
NOAA Technical Report NMFS CIRC-384, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, U.S. Dept. of Commerce (Sept. 1973), 60 pp.

The common higher plants of the beaches, dunes, morainal cliffs, and tidal marshes of Southern New England are treated in an illustrated key, using only vegetative characters. Both scientific and common names are given. Habitat lists of the plants are included, presenting to the investigator the association of plants as they occur in nature. The range of each plant along the Atlantic coast is designated. A glossary of terms is included.
[109 figures, 11 references] Author's abstract

6.32 PECTIC SUBSTANCES OF SEA GRASSES. IX. DEGRADED ZOSTERIN

Mikheiskaya, L. V., R. G. Ovodova, and Yu. S. Ovodov (Inst. Bid. Akt. Vesh-chestv, Vladivostok, U.S.S.R.)
Chemical Abstracts 78, No. 21, 136566 (May 28, 1973)

6.51

The growth rates of juvenile rainbow trout fed the sterilized feed were comparable to or better than the growth rates of trout fed the same feed not sterilized. [7 tables, 16 references] FTP

6.85 FISH-GLUE

Egorova, L. N., V. I. Treshcheva, L. F. Markova, and Yu. V. Maslennikov (All-Union Scientific Research Institute of Ocean Fish Husbandry and Oceanography, U.S.S.R.)
Chemical Abstracts 79, No. 9, 43697f (Sept. 3, 1973)

6.195 CONTENT OF AVAILABLE (DINITROPHENYL) LYSINE IN FEEDS OF ANIMAL ORIGIN. IV. FISH MEAL

Stanchev, Khristo, Lidiya Angelova, Bero Marinov, Margarita Dzharova, and Anna Ikonomova (Inst. Zhivotnovud., Kostinbrod., Bulgaria)
Chemical Abstracts 78, No. 13, 83058j (Apr. 2, 1973)

6.23 PREPARATION AND COMPOSITION OF THE LIVER EXTRACT FROM FISH LIVER RESIDUE. BY-PRODUCT OF FISH LIVER OIL INDUSTRY

Haq, S. A., Salcha Masood, and Razia Rafiq (Pakistan Counc. Sci. Ind. Res. Lab., Karachi, Pakistan)
Chemical Abstracts 79, No. 2, 9809j (July 16, 1973)

6.37 HERE'S HELP FOR KELP LOVERS

Shaw, Eleanor
Seattle Post-Intelligencer (Supplement) Northwest Today, Seattle, Wash. (Sept. 30, 1973), p. 7

This article contains recipes for making pickled kelp, kelp grape conserve, and kelp mint marmalade. Other kelp recipes may be obtained from the Extension Service of the University of Alaska and from the book by Marjorie Furlong and Virginia Pill [Edible? Incredible!, Ellis Robinson Publishing Co., Everett, Wash. (1972), $2.50]. Only bulbs and stems that are picked from a living kelp bed should be used in the preparations. After draining for several hours, the bulbs are split and the stems are cut into 12-in lengths. The centers are cleaned with a bottle brush, and the dark surface layer is peeled with a vegetable parer. To make pickles, the kelp is soaked in brine, washed with cold water, and cubed or sliced. The cubes are soaked in alum solution, washed in cold water, and cooked in an enamel pot until tender. A pickling mixture of vinegar, sugar, and cinnamon and clove oils is boiled and poured over the cooked kelp. After standing overnight, the syrup is drained off, boiled, and poured back over the kelp. The mixture is allowed to stand overnight again. It is then heated to the boiling point, packed in jars, and sealed while hot. The preliminary steps for preparing pickles also apply to preparing kelp grape conserve or kelp mint marmalade. The kelp in these two preparations is ground in a food chopper, and cooked with the following ingredients: grape juice, lemon juice, and sugar (for kelp grape conserve) and vinegar, green coloring, mint, and sugar (for kelp mint marmalade). The thickened mixtures are poured into hot sterilized jelly glasses and sealed immediately with hot paraffin. SW

6.54 ACID PRECIPITATED FISH PROTEIN ISOLATE EXHIBITS GOOD FUNCTIONAL PROPERTIES

Rasekh, J., and A. Metz (National Marine Fisheries Service, NOAA, College Park, Md.
Food Product Development 1, No. 8, 18, 20, 22, 24 (Oct. 1973)

The usefulness of a protein isolate as a food supplement largely depends on the extent of its functional properties. These properties include solubility, dispersibility, wettability, emulsion capacity, nutritive quality, viscosity, and hedonic acceptability. The authors developed a method to produce a fish protein isolate with good functional properties. The amino-acid content of the isolate was similar to that of fish protein concentrate (FPC) prepared by the isopropyl alcohol extraction of whole fish.

The protein isolate was prepared from red hake (Urophycis chuss). Deboned fish was microcut by passing it through a plate with 3 mm holes. A sample was slurried with 0.12 N NaOH and heated with stirring to 65°-75° C within ½ h. After maintaining this temperature for 2 h, the slurry was passed through a 40-mesh screen and cooled to about 50° C. At this point, while maintaining the temperature, 30% hydrogen peroxide was added and the slurry was mixed for 30 min. The pH was then adjusted to precipitate the protein (the isoelectric point was at pH 4.5) with either 5 N phosphoric, hydrochloric, or lactic acid (in different trials). The protein was recovered by filtration or centrifugation and extracted three times with isopropyl alcohol. Each extraction was performed at 60°-65° C for 15 min. The extracted isolate was washed twice with hot water and then either freeze dried or spray dried.

6.72 (1.3) NUCLEOPROTEIN-CONTAINING SHAMPOOS AND SOAPS

General Mills, Inc. (pat.)
French [Patent] 2,135,817 (Jan. 26, 1973)
Chemical Abstracts 79, No. 16, 93741m (Oct. 22, 1973)

6.72 AGENT FOR CONTROLLING AQUEOUS FLUID LOSS INTO WELL FORMATIONS

Yueh, Mao H., and Wesley A. Jordan (General Mills Inc.) (pat.)
U.S. Patent 3,733,274 (May 15, 1973)
Chemical Abstracts 79, No. 16, 94423w (Oct. 22, 1973)

7.42 (9.19) RELATION BETWEEN TOTAL BODY WEIGHT AND CONCENTRATIONS OF MANGANESE, IRON, COPPER, ZINC, AND MERCURY IN WHITE MUSCLE OF BLUEFISH (POMATOMUS SALTATRIX) AND A BATHYL-DEMERSAL FISH ANTIMORA ROSTRATA

Cross, F. A., L. H. Hardy, N. Y. Jones (National Marine Fisheries Service, NOAA, Atlantic Estuarine Fisheries Center, Beaufort, NC 28516), and R. T. Barber
Journal of the Fisheries Research Board of Canada 30, No. 9, 1287-1291 (Sept. 1973)

Reports of other work indicated that concentrations of Mn, Fe, Cu, Cd, and Zn in whole fish either decrease or remain constant, with age (length and weight), but concentrations of Hg increase in the whole fish and in muscle tissue. Studies were performed to determine the relationship of total body weight and concentrations of trace metals in white muscle of two species of fish that inhabit different environments in the Atlantic Ocean. The fish used in the study were bluefish, found in coastal waters of the western Atlantic, and A. rostrata, a deep-sea morid fish taken from a depth of 2,500 m.

The results indicate that the concentrations of Hg in the muscle of the bluefish and A. rostrata increased with the body weight of the fish. In contrast, the concentrations of Fe in bluefish and Cu and Zn in A. rostrata decreased as a function of body weight. Mn content was not related to body weight in either species. The concentrations of Fe in A. rostrata and Cu and Zn in bluefish were also not related to body weight. The authors suggest that the fish, in two different ecosystems, may be in a steady state with regard to Mn, Fe, Cu, and Zn in the environments but not with respect to Hg. On the other hand, the four metals are

7.51 (7.52) AUTOMATED NITROGEN METHOD FOR FEEDS

Gehrke, Charles W., Larry L. Wall, Sr., and Joseph S. Absheer (Experiment Station Chemical Laboratories, University of Missouri, Columbia, MO 65201)
Journal of the Association of Official Analytical Chemists 56, No. 5, 1096-1105 (Sept. 1973)

A fully automated procedure for the determination of nitrogen in grains, forages, feed concentrates, and feed rations was developed. The apparatus consists of an automatic analyzer, a SOLIDprep Sampler II, an auxiliary diluent pump, two proportioning pumps, a continuous digestor, a vacuum pump, a linearized colorimeter with voltage stabilizer, and a recorder. To operate the system at a rate of 20 samples per hour, sample preparation time must be conserved. This is accomplished by homogenizing the sample in a homogenizing vessel. Following homogenation, the sample is withdrawn to a holding coil. The homogenizing vessel can then be cleaned in preparation for the next sample while the analytical system withdraws the sample in the holding coil for analysis. An homogenized sample is mixed with concentrated sulfuric acid and 35% hydrogen peroxide and then is drawn into the digestor. After digestion the sample is subjected to a color development reaction reported by C. W. Gehrke, L. L. Wall, Sr., J. S. Killingley, and K. Inada [JAOAC 54, 651-657 (1971); and JAOAC 55, 467-480 (1972)]. The reacted sample is then compared in a colorimeter to a reference standard. Soy hydrolysate was used as the reference.

7.42 (9.19)

required metabolically and their concentrations found in the fish may be the result of physiological regulation in the tissues. The high activity of organic and inorganic forms of Hg with sulfhydryl groups and lipids in their tissues could reduce the capability of the fish to regulate concentrations of the metal. Furthermore, the levels of available Hg in the ocean may cause the rate of incorporation into fish muscle to exceed the rate of elimination. Additional investigations on other species and metals need to be performed to determine the baseline levels of trace metals in marine organisms and to elucidate the processes that regulate trace metal concentrations in their tissues.
[1 figure, 2 tables, 20 references]

SW

7.51 (7.52)

The automated nitrogen method recovers about 90% of the nitrogen from feed samples compared to the AOAC Kjeldahl method. With feed samples containing significant amounts of refractory nitrogen such as vitamin supplements or nonprotein nitrogen, the automated nitrogen method is probably not applicable. The authors suggest use of the automated method in laboratories doing large numbers of protein determination on feed-type materials.
[4 figures, 8 tables, 5 references]

SW

7.45 (9.19) [DETERMINATION OF MERCURY IN FISH] QUECKSILBERBESTIMMUNG IN FISCHEN

Antonacopoulos, N. (Inst. für Biochem. und Tech., Hamburg, Federal Republic of Germany)
Informationen für die Fischwirtschaft 20, No. 1, 17-20 (1973) (In German)
Food Science and Technology Abstracts 5, No. 6, 150, Abstract No. 6R252 (June 1973)

An atomic absorption spectrophotometric method for determining mercury in fish is described. In reproducibility tests, the mercury content of various species of fish ranged from 0.03 to 1.05 mg Hg/kg.

FTP

7.45 (9.19) [THREE METHODS FOR DETERMINING MERCURY IN TUNA PRODUCTS]

Henrioul, A., and F. Henrioul (182 Chaussee de Waterloo, 5002 Saint-Servais, Namur, Belgium)
Annales des Falsifications et de l'Expertise Chimique 65, No. 703, 274-278 (1972) (In French)
Food Science and Technology Abstracts 5, No. 6, 150, Abstract No. 6R253 (June 1973)

The atomic absorption, the dithizone colorimetric, and the nuclear reaction methods for determining mercury in tuna products are discussed. The atomic absorption method was more simple and rapid than the colorimetric method; the nuclear reaction method requires specialized equipment. Five samples of tuna tested showed less than 0.5 p/m of Hg per gram.

FTP

7.51 PROTEIN NUTRITION IN FISH. II. DETERMINATION OF METABOLIC FECAL NITROGEN AND ENDOGENOUS NITROGEN EXCRETIONS OF CARP

Ogino, Chinkichi, Jun Kakino, and Mao Song Chen (Lab. Fish. Biochem., Tokyo Univ., Tokyo, Japan)
Chemical Abstracts 79, No. 13, 77362h (Oct. 1, 1973)

7.42 (3.3) ANALYSIS OF LEAD AND COPPER IN CANNED FOODS OF ANIMAL ORIGIN

Cicero, L., V. Gianni, S. Massa, and L. Basili (Cent. Studi Ric. Sanita Mil., Italy)
Chemical Abstracts 79, No. 9, 51906p (Sept. 3, 1973)

7.54

The yield of fish isolate ranged from 60-70% with precipitation by either HCl or lactic acid giving the greater yields. The isolate was white in color and contained more than 90% protein. The isolate amino-acid content differed only slightly from that of raw fish and FPC; compared to soy isolate, the fish isolate had higher lysine and methionine content. Wettability of the isolate was excellent and emulsion capacity was greater than soy isolate and FPC; the isolate was more soluble than either at various pH levels. The foam viscosity of the fish isolate was high and it formed stable foam. The fish isolate was highly dispersible in distilled water and more dispersible than soy isolate in salt solution. In a rat-feeding study, the fish isolate was found to be comparable to soy isolate as a nutritional supplement. The fish isolate had a slight fish flavor. The authors suggested that the flavor could be masked by other flavors; they further suggest that the fish isolate could be used as a binder in the preparation of emulsion products such as frankfurters.
[3 figures, 6 tables, 24 references]

WS

6.54 (2.118) [AKP-VNIRO SYSTEM FOR THE MANUFACTURE OF PROTEIN PASTE FROM SMALL MOLLUSCS]

Terent'ev, A. V., and L. D. Tsareva
Rybnoe Khozyaistvo No. 9, 67-68 (1972) (In Russian)
Food Science and Technology Abstracts 5, No. 6, 151, Abstract No. 6R257 (June 1973)

An AKP-VNIRO system is described for the processing of small Antarctic mollusks into a protein-containing product. The system is designed for heavy-duty service aboard factory vessels.

FTP

7.53 EVALUATION OF SOXHLET'S AND BLIGH AND DYER'S METHODS IN THE DETERMINATION OF FAT IN MEAT

Prost, E., and H. Wrebiakowski
Z. Lebensmittelunters.u.-Forsch. 149, No. 4, 193-196 (1972) (In English)
Food R.A. Abstracts 26, No. 1, Abstract No. 8, 2 (Jan. 1973)

The effect of each method on the level of fat determined with respect to the type of meat examined and the accuracy of the results obtained were compared. It was concluded that Bligh and Dyer's method is more accurate than Soxhlet's for the determination of fat in meat. C.S.B. Reprinted

7.53 EFFECT OF α-TOCOPHEROL DEFICIENCY ON CARP. III. ANALYTICAL METHOD FOR TRIGLYCERIDE COMPOSITION OF FISH LIPID

Matsui, Masami, Takeshi Watanabe, and Nobuo Ikekawa (Tokyo Res. Lab., Shimadzu Seisakusho Co., Ltd., Tokyo, Japan)
Chemical Abstracts 79, No. 5, 29175c (Aug. 6, 1973)

7.9 (9.19) FISH BILE ANALYSIS: A POSSIBLE AID IN MONITORING WATER QUALITY

Lech, John J., Sharon K. Pepple, and Charles N. Statham (Dept. of Pharmacology, Medical College of Wisconsin, Milwaukee, WI 53233)
Toxicology and Applied Pharmacology 25, No. 3, 430-434 (July 1973)

Monitoring of the quality of water by use of chemical methods is difficult because of the low levels of compounds and the large volume of water involved. Some aquatic organisms are able to concentrate lipid-soluble compounds (such as DDT or the PCB's) to levels many times greater than that in their surrounding water. Thus, there is current interest in the concept of "biomagnification" of chemicals by aquatic organisms and its use in monitoring water quality. Apparently, many species of fish have the enzymes to carry out certain biotransformation reactions. In previous work, the senior author and coworker demonstrated the conjugation of 3-trifluoromethyl-4-nitrophenol with glucuronic acid and its isolation from the bile of exposed rainbow trout. Apparently the trout have the capacity to conjugate certain phenolic compounds and to excrete them in bile in high concentrations.

In the present experiments, rainbow trout (Salmo gairdneri) were exposed to [^{14}C]-carbaryl (A), [^{14}C]-3-trifluoromethyl-4-nitrophenol (B), and [^{14}C]-DDT (C). The fish were able to concentrate these compounds in the bile to a much greater level than that in their surrounding water, the bile-level to water-level ratio for (A) was 947, for (B) was 1,061, and for (C) was 124. Thus, application of this biomagnification concept may be useful as an aid in monitoring water quality. [1 figure, 1 table, 13 references] FTP

7.80 CHILDREN ACCEPT FISH-BASED SCHOOL LUNCH ENTREES

Beach, Betty L., Mary Jo Hitchcock, Grayce E. Goertz (Dept. of Food Science and Food Systems Administration, University of Tennessee, Knoxville, Tenn.), and Anne Cook
Food Product Development 7, No. 7, 104, 106, 110 (Sept. 1973)

About 25 million children are fed daily through local school lunch programs. The potential for more use of fish exists in these programs. A cooperative study by United States and Tennessee State Government agencies resulted in fish entrees that were low cost, nutritious, and easy to prepare in school lunch programs. The target consumers were children between 6 and 12 years of age who participated in the school lunch programs. Fish entrees were developed in the laboratory using five kinds of fish. Small-scale sensory testing was performed using such characteristics as flavor, texture, color, shape, and serving temperature. The 10 most acceptable entree formulations were selected for testing in 20 schools. The entrees contained either canned tuna or mackerel or frozen cod, perch, or haddock. Names were given to each entree to enhance its appeal such as, sailor boy's pizza and tuna dog on frankfurter bun. An hedonic scale was used to measure acceptance. The test plan included a preliminary test day and three following test days, and each school served the same menu each time the entree was tested. The children were instructed in taste testing and marking the score card. Nine of the entrees were rated acceptable by more than 50% of the children participating in the tests. Formulations for the entrees have been reported by B. Beach, G. E. Goertz, and M. J. Hitchcock [School Foodservice J. 25, No. 10, 54-64 (1971)].
[1 figure, 2 tables, 5 references] SW

7.9 (9.19) THE SEPARATION OF COLLECTORS USED AS COPRECIPITANTS OF TRACE ELEMENTS IN SEAWATER BY ADSORPTION COLLOID FLOTATION

Matsuzaki, Carrie, and Harry Zeitlin (Dept. of Chemistry and Hawaii Institute of Geophysics, Honolulu, HI 96822)
Separation Science 8, No. 2, 185-192 (Apr. 1973)

Most trace elements cannot be determined directly in seawater because of the limitations of analytical methods, and thus they must be concentrated prior to analysis. The useful preconcentration techniques include ion exchange, solvent extraction, cocrystallization, and coprecipitation. The last method appears to be the most useful because it is versatile and a wide range of elements can be collected satisfactorily. The disadvantages of the coprecipitation method are the long settling times required and the tedious filtration procedures involved. Recently, the junior author and coworkers published a series of articles describing the use of conventional collectors in combination with an adsorbing flotation process for the separation of some trace cationic and ionic metallic species in water. By using a collector-surfactant-air system at optimum pH, they were able to separate the trace metals by floating them to the surface of the seawater in 2-3 min as an easily removable foam (thus eliminating the time needed for settling and filtration). In the present study, the researchers screened nine surfactants for their ability to float six collectors (which have been used to coprecipitate trace metallic species in seawater) to the surface of seawater by adsorption colloid flotation as a function of pH. The collectors tested were $Fe(OH)_3$, $Th(OH)_4$, $Al(OH)_3$, HgS, CdS, and MnO_2. The surfactants used were dodecyl benzene sodium sulfonate, lauryl pyridinium chloride, N-dodecylamine hydrochloride, sodium laurate, sodium

7.9 (9.19) CHROMATOGRAPHIC ANALYSIS OF PESTICIDE RESIDUES

Sherma, Joseph (Dept. of Chemistry, Lafayette College, Easton, Pa.)
CRC Critical Reviews in Analytical Chemistry 3, No. 3, 299-354 (Aug. 1973)

This review covers gas, liquid, column, paper, and thin-layer chromatographic procedures for the identification and determination of residues of pesticides and their metabolites in food, human, and environmental samples. Methods which will serve for the analysis of multiple pesticide residues are emphasized. Several ancillary nonchromatographic methods useful for identifying pesticides and analytical procedures for residues of polychlorinated biphenyls are also discussed.
[3 figures, 3 tables, 487 references] FTP

7.43 RELATION BETWEEN CONTINUOUS BIOLOGICAL MONITORING AND WATER QUALITY STANDARDS FOR CHRONIC EXPOSURE

Cairns, John, Jr., Richard E. Sparks, and William T. Waller (Cent. Environ. Stud., Virginia Polytech. Inst., Blacksburg, Va.)
Chemical Abstracts 79, No. 4, 62265e (Sept. 17, 1973)

7.9 (9.19)

lauryl sulfate, sodium stearate, stearyl amine, octadecyl trimethyl ammonium chloride, and sodium octyl sulfate.

The ability of any of the surfactants to float a collector fluctuated widely and was generally dependent upon pH. Also, the foam characteristics varied considerably. The authors present their observations of the visual phenomena encountered as an aid to other workers interested in the separation of a trace element from seawater by flotation.
[6 tables, 7 references] FTP

8.0 PROXIMATE COMPOSITION OF THE EUROPEAN BASS, DICENTRARCHUS LABRAX FROM THE BAY OF NAPLES

Stirling, Hadrian P. (Dep. Oceanogr., Univ. Southampton, Southampton, England)
Chemical Abstracts 78, No. 25, 156868k (June 25, 1973)

7.598 DETERMINATION OF ORGANIC ACIDS IN FOODS BY LIQUID CHROMATOGRAPHY

Palmer, James K., and Dieter M. List (Dept. of Nutrition & Food Science, Massachusetts Institute of Technology, Cambridge, MA 02139)
Journal of Agricultural and Food Chemistry 21, No. 5, 903-906 (Sept.-Oct. 1973)

Various organic acids occur in foods, and they may influence flavor, stability, and keeping quality. Also, organic acids may be produced during fermentation or curing of foods. They have been proposed as an index of spoilage in certain foods. This paper contains a description of a simple and rapid method for determining organic acids in foods by high efficiency anion exchange chromatography. Microequivalent amounts of up to 15 common food acids can be separated in about 75 min. These include citric, isocitric, α-ketoglutaric, succinic, fumaric, malic, oxalacetic, quinic, shikimic, acetic, galacturonic, lactic, malonic, oxalic, and tartaric acids.
[3 figures, 1 table, 13 references] FTP

7.598 SPECTROPHOTOMETRIC MEASUREMENT OF HALOGENATED ACETIC ACID DERIVATIVES IN FISH PRODUCTS

Lopez-Benito, Manuel (Inst. Invest. Pesq., Vigo, Spain)
Chemical Abstracts 78, No. 11, 70270x (Mar. 19, 1973)

8.42 (1.9) DYNAMICS OF TRACE ELEMENTS IN STURGEON MUSCLE

Andreev, V. V. (U.S.S.R.)
Chemical Abstracts 79, No. 3, 16016b (July 23, 1973)

8.42 UPTAKE OF SELENIUM BY AQUATIC ORGANISMS

Sandholm, M., H. E. Oksanen, and L. Pesonen (Dep. Med., Coll. Vet. Med., Helsinki, Finland)
Chemical Abstracts 79, No. 13, 76100j (Oct. 1, 1973)

8.42 (1.92) CONTENTS OF CALCIUM, IRON, AND PHOSPHORUS IN SOME BRAZILIAN FRESHWATER FISHES

Camargo, Luiz A. de Arruda, Wilson J. Yasaka, Seizi Oga, and Kazue Wakl (Inst. Cienc. Biomed., Univ. Sao Paulo, Sao Paulo, Brazil)
Chemical Abstracts 79, No. 3, 16014z (July 23, 1973)

8.5 AMINO ACID COMPOSITION OF NITROGENOUS SUBSTANCES OF FISH AND BRINE IN CANNED TALLIN SPRATS

Krosing, V. A., and K. Kask (U.S.S.R.)
Chemical Abstracts 77, No. 7, 46886m (Aug. 14, 1972)

8.64 DETERMINATION OF SOME B VITAMINS IN FRESH AND CANNED FISH

Witkuszynska, Barbara (Zakl. Bromatol., Akad. Med., Gdansk, Poland)
Chemical Abstracts 79, No. 5, 30580n (Aug. 6, 1973)

9.1 (0.4) RESPONSE OF LOBSTERS HOMARUS AMERICANUS TO ODOR SOLUTION IN THE PRESENCE OF BLEACHED KRAFT MILL EFFLUENT

McLeese, D. W. (Fisheries Research Board of Canada, Biological Station, St. Andrews, New Brunswick, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 2, 279-282 (Feb. 1973)

Food odors carried in solution by water currents initiate food search in lobsters; this behavior is involved in the lobsters' attraction to baited traps. It is possible that bleached kraft mill effluent could adversely affect the ability of lobsters to respond to odor by masking the food odor or by reversible or irreversible blocking of the lobsters' chemoreceptors. This study, therefore, was carried out to determine if bleached kraft mill effluent in sea water affects the ability of lobsters to detect and respond to food odor. In test runways, the author found that lobsters moved upstream of seawater containing low concentrations of bleached kraft mill effluent towards a source of dilute solutions of freeze-dried cod muscle extract. He concluded that the feeding response of lobsters is not affected by bleached kraft mill effluent at low concentrations. [2 tables, 12 references] FTP

8.53 (6.4)(4.10) LIPID COMPOSITION OF SELECTED MARGARINES

Carpenter, D. L., and H. T. Slover (Nutrition Institute, ARS, U.S. Dept. of Agriculture, Beltsville, MD 20705)
Journal of the American Oil Chemists' Society 50, No. 9, 372-376 (Sept. 1973)

This article contains data on the natural and altered fatty acid composition, triglyceride structure, and tocopherols of 10 margarines available in the market. Data on the fatty acid composition are shown in the table that follows. [3 figures, 5 tables, 29 references] FTP

Description of the margarine		Fatty acid content of the margarine in wt %										
Type	Brand No.	14:0 and lower	16:0	18:0	18:1	18:2	18:2 isomers A	18:2 isomers B	18:3	20:0	20:2	22:0
Hard cube	1	<0.1	9.6	5.5	67.6	11.0	1.6	2.6	0.7	0.4	0.3	0.5
	2	0.1	8.7	5.2	67.2	10.6	1.9	3.9	0.9	0.3	0.3	0.6
	3	0.7	9.6	4.9	50.4	31.0	0.8	0.9	0.7	0.4	0.2	0.3
	4	<0.1	8.4	4.3	51.5	31.7	--	3.1	0.6	0.3	<0.1	<0.1
	5	54.8	9.5	6.2	12.3	16.3	--	--	0.2	0.2	<0.1	0.2
Whipped cube	1	<0.1	9.2	5.7	62.6	15.3	1.2	3.3	1.1	0.3	0.3	0.5
Soft tub	1	0.1	9.2	5.6	55.8	24.2	0.8	1.6	1.3	0.3	0.3	0.5
	2	0.1	9.9	5.8	52.0	25.8	0.8	2.2	1.8	0.4	0.5	0.5
	3	<0.1	11.2	4.3	47.1	33.6	0.4	1.5	1.1	0.3	0.1	0.4
	4	0.1	8.2	5.0	40.2	43.3	0.6	0.6	1.4	0.3	0.2	<0.1

9.10 (9.11)(1.0112) A REVIEW OF THE OCEANOGRAPHY AND RENEWABLE RESOURCES OF THE NORTHERN GULF OF ALASKA

Rosenberg, Donald H. (editor) (Institute of Marine Science, University of Alaska, College, AK 99701)
IMS Report R72-23 (Feb. 1973), ix + 690 pp. (Institute of Marine Science, University of Alaska, Fairbanks, AK 99701)

The area covered by the review is mainly in the region of the continental shelf north of 59° N. (near Skagway, Alaska) and west to 147° W. (Prince William Sound). Twenty-one authors prepared 22 articles. The first 10 articles cover the oceanography of the area and include intertidal ecology, birds, and marine mammals. The remaining articles are on the fisheries in the Gulf of Alaska. The tanner, king, and Dungeness crab, and shrimp fisheries are described in a chapter each. The weathervane scallop fishery is reviewed, and the status and future of the razor and butter clam and cockles fisheries are covered. A chapter for each of the fin fisheries is given: Pacific halibut, groundfish, salmon, steelhead, and the marine sport fishery. Oceanographic data are provided in one appendix, and a bibliography on birds of the northern Gulf of Alaska is given in another appendix. Each chapter contains illustrations and tables and concludes with a bibliography. SW

8.59 THE 3,4-BENZPYRENE CONTENT OF VARIOUS SMOKE PREPARATIONS
(3.4)

Toth, L., and W. Blaas
Fleischwirtschaft 52, No. 9, 1171 (1972) (In German; English summary)
Food R.A. Abstracts 26, No. 1, Abstract No. 137, 23 (Jan. 1973)

Liquid smoke preparations were examined for their 3,4-benzpyrene content and it was found that the use of these preparations for meat products would produce a lower 3,4-benzpyrene content in the meat than conventional smoking methods. However, it was pointed out that thorough toxicological examination of these liquid smoke preparations is necessary. C.S.B. Reprinted

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8.59 BIOCHEMICAL INVESTIGATIONS OF EDIBLE MOLLUSKS OF KERALA.
(1.8) 1. NUTRITIONAL VALUE OF SOME BIVALVES

Suryanarayanan, H., and K. M. Alexander (Dep. Zool., Univ. Kerala, Trivandrum, India)
Chemical Abstracts 79, No. 9, 51935x (Sept. 3, 1973)

8.51 [PROTEIN COMPOSITION OF SHARK MEAT]

Gubanova, A. G. (Vses. Zaochnyi Inst. Pishchevoi Promyshlennosti, U.S.S.R.), K. P. Lemarin'e, and V. P. Skachkov
Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya No. 2, 25-26 (1972) (In Russian)
Food Science and Technology Abstracts 5, No. 6, 155, Abstract No. 6R276 (June 1973)

The meat of the sharks (Isurus oxyrinchus and Carcharhinus obscurus) from the Indian Ocean contained albumins, globulins, and myostromins (not present in bony fish). The meat contained 16.2-19.8% stroma proteins which give toughness to the meat. The authors also discuss changes in the basic components of the proteins during processing (maceration, drying, smoking) of the shark meat. FTP

8.51 AMINO ACID COMPOSITION OF TOTAL PROTEINS IN THE BODY
(9.16) OF TWO-YEAR-OLD CARP RAISED IN CROWDED HATCHERY PONDS

Maslova, N. I. (Mosk. S.-Kh. Akad. im. Timiryazeva, Moscow, U.S.S.R.)
Chemical Abstracts 79, No. 7, 41083d (Aug. 20, 1973)

9.12 WHALES' RESPIRATORY VOLUME AS A POSSIBLE RESONANT RECEIVER
(0.4) FOR 20 HZ SIGNALS

Barham, E. G. (U.S. Naval Undersea Center, San Diego, CA 92132)
Nature 245, No. 5422, 220-221 (Sept. 28, 1973)

Long, repetitious trains of powerful, low-frequency sound pulses, that vary about frequencies centered at 20 Hz have been recorded at ocean listening stations. The finback whale is reported to be one of the sources of these sounds. Suggestions have been made that the whales use the sounds as signals in long-range communication. In underwater acoustics, the target strength of a fish is based upon the swim bladder gas-volume resonance at certain frequencies. Applying this phenomenon to whales, a 2,000-l lung volume (reported for a 21.6-m finback whale) was assumed to be a spherical gas form, and its resonance frequency at an arbitrary depth was calculated by the formula of I. B. Andreeva [Soviet Phys. Acoust. 10, 17 (1964)]. The calculated resonance frequency matched the frequencies reported to be produced by the whales. The possible projecting mechanism of the 20-Hz pulses has been speculated to be the resonant respiratory volume (which is suggested to be active in receiving the frequencies) coupled to a transmitting capability.
[1 figure, 12 references] SW

9.1 CHOICE OF COLORS OF FOOD ITEMS BY RAINBOW TROUT
(0.4) (SALMO GAIRDNERI)

Ginetz, R. M., and P. A. Larkin (Institute of Animal Resource Ecology, University of British Columbia, Vancouver 8, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 2, 229-234 (Feb. 1973)

Relative to the predation of sockeye salmon fry by rainbow trout, the question was raised as to whether the trout tend to feed more on some colors of food items in particular environmental settings. In this study, eggs of rainbow trout were dyed various colors and were offered in different combinations of two colors, in experimental streams, to rainbow trout juveniles. In a separate test, the color of the bottom of the stream was varied, and in another test the light intensity was varied.

Against a pale, greenish-blue background and in daylight, the color preference, in descending order, of the rainbow trout was blue, red, black, orange, brown, yellow, and green. Although this order of preference related to contrast with the background, there were actual preferences for color. Color combinations such as yellow and black and yellow and blue were preferred. When the background color was varied, color preferences were not statistically demonstrated. When the light intensity was low, the order of preference for colors was yellow, red, blue, and black.

These results seem to indicate a definite color discrimination by the trout and preferences for different colors in particular environmental settings. Such information may eventually be useful in situations where it may be desirable to reduce rates of predation of salmon fry by presenting foods to satiate predators.
[3 tables, 3 references] FTP

9.13 (0.32)(0.38) (1.92) NITROGEN METABOLISM IN CHANNEL CATFISH, ICTALURUS PUNCTATUS--I. TISSUE DISTRIBUTION OF ASPARTATE AND ALANINE AMINOTRANSFERASES AND GLUTAMIC DEHYDROGENASE

Wilson, Robert P. (Dept. of Biochemistry, Mississippi State University, Mississippi State, MS 39762)
Comparative Biochemistry and Physiology 46, No. 3B, 617-624 (Nov. 15, 1973)

The intensive aquaculture of channel catfish has developed rapidly. Knowledge of the nitrogen metabolism of this fish is necessary to design feeds and feeding regimes that will promote maximum production under aquaculture conditions. In the metabolism of nonessential amino acids, glutamic dehydrogenase (GDH), aspartate aminotransferase (AspT), and alanine aminotransferase (AlT) are important enzymes. Experiments were conducted to determine the activity of these enzymes in various tissues of channel catfish.

Samples of tissue were taken from cultured and wild catfish and homogenized and sonified. After centrifugation, the supernatant was assayed for enzyme activity. GDH was assayed in accordance with the method of J. A. Olson and C. B. Anfinsen [J. Biol. Chem. 197, 67-79 (1952)]; AspT was assayed by the method of A. Karmen [J. Clin. Invest. 34, 131-133 (1955)]; and AlT was assayed in the procedure described by F. Wroblewski and J. S. La Due [Proc. Soc. Exp. Biol. Med. 91, 569-571 (1956)].

The results of the assays indicated that the AlT specific activity ranked in the following order in wild catfish tissues from the highest to the lowest: liver>kidney>gill and heart>gut tract>spleen>brain. In cultured catfish AlT specific activity in the tissues ranked as follows: liver>kidney>gut tract and

9.14 (1.81) THE EFFECT OF SUPPLEMENTARY ALGAL FEEDING OF A HATCHERY BREEDING STOCK OF OSTREA EDULIS L. ON LARVAL VIGOUR

Helm, M. M. (Ministry of Agriculture, Fisheries and Foods, Fisheries Experiment Station, Conway, Caernarvon, Wales, United Kingdom), D. L. Holland, and R. R. Stephenson
Journal of the Marine Biological Association of the United Kingdom 53, No. 3, 673-684 (Aug. 1973)

An earlier report described the technique for conditioning European flat oysters (O. edulis L.) to produce viable larvae in the laboratory. Included in the technique was the supplementing of the natural food in the seawater supply with cultured unicellular algae. The effect of the extra food on the subsequent vitality of the larvae was not reported. In this present paper, experiments were performed to determine the value of supplementing natural oyster food in seawater with the unicellular alga Tetraselmis suecica (Kylin) Butch. and the effects on the larvae produced. The results indicate that the brood oysters given the added food produced more larvae than the control oysters receiving only the natural phytoplankton in the seawater supply. Many of the broods of larvae from oysters receiving the extra food were liberated sooner; these larvae grew at a faster rate and provided more spat than larvae from the control oysters.

Other reports indicated that lipid is the principal energy reserve of oyster larvae. In this present report, the authors found a positive correlation between the vigor of the larvae, in terms of growth, and the proportion of neutral lipid to total body composition. The viability of the larvae declined as the length of the conditioning period of the adults increased prior to spawning; that is, the

9.13 (0.32)(0.38) (1.92) NITROGEN METABOLISM IN CHANNEL CATFISH, ICTALURUS PUNCTATUS--II. EVIDENCE FOR AN APPARENT INCOMPLETE ORNITHINE-UREA CYCLE

Wilson, Robert P.
Comparative Biochemistry and Physiology 46, No. 3B, 625-634 (Nov. 15, 1973)

In part I of this series, the tissue distribution of enzymes active in amino-acid metabolism in channel catfish were described. In this present report, channel catfish enzymes active in the ornithine-urea cycle are described. [When the carbon chains of amino acids are used to provide energy in mammals, the reduced nitrogen components of the amino acids are converted to urea via the ornithine-urea cycle. Abstractor's note]

The livers and kidneys of channel catfish were homogenized and extracted and assayed for the enzymes carbamyl phosphate synthetase, ornithine transcarbamylase, those in the arginine synthetase system, and arginase. The assay methods were based on those of G. W. Brown and P. P. Cohen [Biochem. J. 75, 82-91 (1960)]. The assays showed the presence of carbamyl phosphate synthetase, ornithine transcarbamylase, and arginase in liver tissue. The arginine synthetase system in the ornithine-urea cycle was not detected. In the kidney tissue extracts, carbamyl phosphate synthetase and the arginine synthetase system were undetectable; ornithine transcarbamylase and arginase were present. The author suggests that the enzymes required in the arginine synthetase system either may not be present in the liver, or their levels may be too low for the assay method used. Based on

9.15 TOXINS OF CHRYSOPHYCEAE

Shilo, Moshe (Hadassah Med. Sch., Hebrew Univ., Jerusalem, Israel)
Chemical Abstracts 79, No. 5, 28140a (Aug. 6, 1973)

9.15 (9.19) CONCEPTS AND OUTLOOK IN TESTING THE TOXICITY OF SUBSTANCES TO FISH

Brown, V. M. (Water Pollut. Res. Lab., Dep. Environ., Stevenage, England)
Chemical Abstracts 79, No. 9, 49577p (Sept. 3, 1973)

9.14 (1.37)(1.92) COMPOSITION OF AMINO ACIDS IN PROTEINS OF DRY MIXED FEEDS FED TO CARP (CYPRINUS CARPIO) AND TROUT (SALMO GAIRDNERI)

Wuensche, J., and Marie Luise Albrecht (Forschungszent. Tierprod. Dummerstorf-Rostock, Dtsch. Akad. Landwirtschaftswiss, Berlin, Dummerstorf/Rostock, East Germany)
Chemical Abstracts 78, No. 9, 56816y (Mar. 5, 1973)

larvae spawned at the beginning of the supplemented feeding regime were more vigorous than the larvae spawned as the regime progressed. The authors suggest that this loss of vigor of the larvae may be due to the decline in the dry meat weight and the condition of the adult oysters in spite of the supplemented feeding regime.
[5 figures, 5 tables, 12 references] SW

9.14 (1.81)

9.14 RELATION BETWEEN THE FOOD CONSUMPTION AND METABOLIC RATE OF BLENNIUS PHOLIS

Wallace, J. C. (Inst. Physiol., Univ. Glasgow, Glasgow, Scotland)
Chemical Abstracts 79, No. 3, 16085y (July 23, 1973)

gill>heart>brain and spleen. The AspT specific activity in the wild catfish tissues ranked as follows: heart and liver>kidney>brain>gill and gut tract>spleen. In the cultured catfish, AspT specific activity in the tissues ranked as follows: heart and liver>kidney>brain>gill and gut tract>spleen. The GDH specific activity for cultured catfish tissues ranked as follows: gill>liver and gut tract>kidney> spleen>heart>brain. There was no difference in GDH specific activity in wild catfish tissues. The author concludes that the three enzymes are significant in the overall intermediary metabolism of amino acids in channel catfish. The highest activities were observed in the liver and kidney tissues, and significant activity was found in the gill tissue.
[4 tables, 20 references] SW

9.13 (0.32)(0.38)(1.92)

9.15 (1.92) BIOENERGETICAL ASPECTS OF THE INFLUENCE OF 2,4-D-SODIUM SALT ON THE EARLY DEVELOPMENT STAGES IN CARP (CYPRINUS CARPIO)

Kamler, E. (Dep. Bioenerg. Bioprod., Nencki Inst. Exp. Biol., Warsaw, Poland)
Chemical Abstracts 79, No. 7, 39109y (Aug. 20, 1973)

9.15 (9.19) EFFECT OF SOME DDT AND METHOXYCHLOR ANALOGS ON TEMPERATURE SELECTION AND LETHALITY IN BROOK TROUT FINGERLINGS

Gardner, D. R. (Dep. Biol., Carleton Univ., Ottawa, Ontario, Canada)
Chemical Abstracts 79, No. 9, 49640d (Sept. 3, 1973)

9.14 (9.13) METABOLISM AND NUTRITION OF FISH

Kausch, Hartmut (Limnol. Inst., Univ. Freiburg, Constance, Germany)
Chemical Abstracts 79, No. 9, 50824y (Sept. 3, 1973)

the data yielded by these experiments, the route of urea synthesis in catfish liver is uncertain. The author is conducting further experiments to elucidate nitrogen excretion patterns of channel catfish.
[3 figures, 2 tables, 21 references] SW

9.13 (0.32)(0.38)(1.92)

9.16 CONSTRAINTS TO AQUACULTURAL DEVELOPMENTS

Pritchard, G. I. (Fisheries and Marine Service, Environment Canada, Ottawa, Canada)
Canadian Fisherman & Ocean Science 59, No. 4, 22-27 (Aug. 1973)

Aquaculture should not be viewed as a get-rich scheme nor a quick solution to the protein deficiency in the world. Aquaculture must be considered as a system of production of foods which can be marketed profitably; it must compete for credit, capital, technical expertise, labor, and markets. A broad spectrum of environmental and business activities are covered by such a food production system and include: the ecosystem, production processes and strategies, internal business arrangements, and product development and marketing. The culture of aquatic organisms implies confinement with intensive rearing at fixed locations, and there are certain constraints to the establishment of aquacultural enterprises. The greatest constraint is related to the complexity of the system. Aquaculture depends upon science and technology and requires substantial development costs. Another major constraint is the lack of low-cost food supplies. Fish require high protein feedstuffs and rely on fat rather than carbohydrate for energy. The shortage of processed feeds at reasonable prices to supply fish farming needs is the major deterrent to freshwater aquaculture. Disease is a constraint that continues as a high risk. This is likely to limit the size of the operation. The location of marine aquaculture operations depends upon access to coastal waters that are protected from industrial pollution. Site location can be critical relative to climate, temperature of water supplies, proximity to technical and engineering assistance, and sources of energy. Steady and reliable sources of seed stock for

9.16 (1.87) GENETIC PRINCIPLES; SYSTEMS ENGINEERING USED IN CONTINENT-SPANNING LOBSTER-FARMING RESEARCH PROJECT

Rutherford, Donald
American Fish Farmer & World Aquaculture News 4, No. 9, 4-6 (Aug. 1973)

Other work showed that the American lobster can be raised to maturity in less than 2 years under controlled conditions. Wild lobsters require 5 to 8 years to mature. Using information gained in lobster rearing in the Massachusetts Lobster Hatchery on Martha's Vineyard, Robert A. Shleser, of the University of California at Davis, has undertaken the development of the technology required to grow large numbers of lobsters to marketable size, in a short time, for profit. Systems engineering techniques are being applied to solving the problems of mass lobster culture. Information from a wide variety of scientific disciplines is required in this approach; the researchers include a marine food technologist, civil and sanitary engineers, a fish physiologist, a geneticist, an agricultural economist, and others. The Davis facilities, those at Bodega Marine Laboratory of the University of California, and the lobster hatchery on Martha's Vineyard are involved in the research work. Genetics is important in the project because economically desirable traits in lobsters can be selected such as rapid growth, disease resistance, production of larger claws and tails, and other characteristics. Feed for the lobsters is being investigated to provide ingredients of high nutrition and low cost; synthetic substitutes with nutritive values similar to those obtained from brine shrimp, which is successful in lobster nutrition, are being developed. Achieving maximum growth, low mortality, and freedom from disease depends upon maintaining the quality of water entering the aquaculture project. Closed loop

9.17 (9.3) TWO MECHANISMS THAT MAKE IT IMPOSSIBLE TO MAINTAIN PEAK-PERIOD YIELDS FROM STOCKS OF PACIFIC SALMON AND OTHER FISHES

Ricker, W. E. (Fisheries Research Board of Canada, Biological Station, Nanaimo, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 9, 1275-1286 (Sept. 1973)

In this paper the author examined the history of the yields produced in certain fisheries (mostly salmon fisheries). He found that, not withstanding the best management, the fisheries consistently failed to produce at expected levels. As a result of the analysis, he suggested two mechanisms that could explain the unexpectedly lower yields. The mechanisms are based upon modifications of mathematical models previously reported and other calculations.

The first mechanism has two aspects: the catch taken at a given rate of exploitation is greater when the rate of exploitation has been increasing than when it is steady or falling; in addition, the yield taken from the progeny of the spawning of a given size is greater when the rate of exploitation has been increasing than when it has been steady or decreasing. This mechanism is applicable to single stocks or to mixtures of stocks.

The second mechanism is defined as follows: the recruitment per spawner, from a mixture of stocks of different productivities, is higher when the rate of exploitation is increasing than when it is steady or decreasing. This mechanism is independent of the first mechanism (and additional to it in its effect on the catch).

9.17 SPHAEROMA TEREBRANS: A THREAT TO THE MANGROVES OF SOUTHWESTERN FLORIDA

Rehm, Andrew (Dept. of Biology, University of South Florida, Tampa, FL 33620), and Harold J. Humm
Science 182, No. 4108, 173-174 (Oct. 12, 1973)

A wood boring crustacean, S. terebrans Bate (order Isopoda), can grow to 10 mm in length at the adult stage. It enters the prop roots of red mangroves (Rhizophora mangle L.) through a bored hole of about 5 mm in diameter. The organism reproduces inside the roots. The young pass through all developmental stages within the roots and join the adults in wood boring. In a demonstration of wood boring capability, the isopods were placed in a container of seawater with pieces of mangrove prop roots and seedlings. Within 24 h, the isopods bored into the roots and seedlings and produced hollowing within a few days.

The isopods are attacking stands of red mangroves in the Ten Thousand Islands region and fringes of the southern Florida shoreline. When the prop roots of the mangroves are destroyed, the trees are exposed to undercutting wave and current action. Summer squalls and hurricanes then cause the poorly supported individual trees to fall into the water. The standing trees are then exposed to the same kind of action. Continued attack by the isopod may eliminate the protective outer edge of the mangrove stands; this results in a gradually receding shoreline and threatens the features of the shoreline environment that depend upon the mangrove barrier.

[3 figures, 6 references] SW

9.16 (1.87)

water treatment and circulation systems were developed which remove solid waste, ammonia, and biological materials from the water, and then oxygenates and thermally adjusts it. Synthetic seawater can be used successfully in lobster culture; therefore, they and other species may be cultured in locations not necessarily at coastlines but where market or other factors are favorable. Closed loop systems eliminate the entrainment of pesticides or other environmental poisons in the project water. These poisons could exist in an open system that admits nearby stream water. The space requirements of the lobster are being evaluated to prevent cannibalism among the larger ones. The information generated by these experiments will be applicable to the culture of other aquatic species.
[5 photographs] SW

9.16 PROCESS AND APPARATUS FOR MARICULTURE PRODUCTION

Moe, Martin A., Jr. (Juno Isles, Fla.), and J. P. Dunathan; Oceanography Mariculture Industries, Inc. (pat.)
U.S. Patent 3,765,372 (Oct. 16, 1973)

This patent is for a procedure of raising marine fishes, such as pompanos, under mariculture conditions. By varying the temperature and light exposure, the time to reach sexual maturity, spawning, hatching of fertilized eggs, and rearing of larvae are controlled. SW

9.16

aquaculture operations is a necessity. These sources may be in the form of other aquacultural production or capture from the wild in the larval stage. Cultivation of single species under intense environmental conditions must be watched continuously to minimize pollution effects from auxiliary chemical and pharmaceutical treatments. Multiculture of various compatible species is more desirable.

The author suggests that government assistance programs should be devised to promote aquaculture enterprise. SW

9.16 VETERINARY MEDICAL ASPECTS OF MAINTAINING THE HEALTH OF (9.15) AQUATIC FOOD ANIMALS

Klontz, G. W. (Aqua. Anim. Res. Prog., Dep. Vet. Microbiol., Texas A. & M. Univ., College Station, TX 77843)
J. Am. Vet. Med. Assoc. 161, No. 11, 1489-1491 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 6, 223, Abstract No. 3Q6686G (June 1973)

Increases in aquaculture necessitates greater consideration of fish diseases. Of the diseases needing attention, respiratory infection is the most important. Disease prevention practices include immunization administered orally, detection and elimination of carriers, good management and nutrition, and transportation restrictions. The author considers each of these aspects relative to hatchery practices and the field of legislation. SW

9.17 TWO MODELS FOR SEASONAL GROWTH IN FISHES

Pitcher, T. J. (School of Biological and Environmental Sciences, New University of Ulster, Coleraine, North Ireland), and P. D. M. MacDonald
Journal of Applied Ecology 10, No. 2, 599-606 (Aug. 1973)

The average growth in a fish population has been described by means of the von Bertalanffy mathematical model by L. M. Dickie [Mathematical Models of Growth. Methods for the Assessment of Fish Production in Fresh Waters (I.B.P. Handbook No. 3), W. E. Ricker, ed. Blackwell Scientific Publications, Oxford (1968), pp. 120-123]. Modifications of the model by K. R. Allen ["A Method of Fitting Growth Curves of the von Bertalanffy Type to Observed Data," J. Fish. Bd. Can. 23, 163-179 (1966)] or by W. E. Ricker ["Handbook of Computation for Statistics of Fish Populations," Bull. Fish. Res. Bd. Can. 119, 1-300 (1958)] or by D. H. Cushing [Fisheries Biology - A Study in Population Dynamics. Univ. of Wisconsin Press (1968)] are used to relate growth of fish populations to size or yield estimates. This present article describes two modifications of the von Bertalanffy model of fish growth which may be used to account for seasonal growth in fish populations and may also be used in simulation models. Each modification introduces an additional parameter. In the first, the fish population follows the von Bertalanffy model simulation of growth during the summer season but does not increase the length of individuals over the winter. In the second modification, the same effect is achieved by replacing the von Bertalanffy rate parameter K with a sine function having a wave length equal to 1 year. In this mathematical model, changes in the growth rate occur more smoothly. Both modifications may be linked to water temperature in a simulation model.
[5 figures, 2 tables, 10 references] SW

9.17 (9.3)

Under conditions of moderate overexploitation combined with both mechanisms, the historical maximum catch in a salmon fishery could have been twice the maximum sustainable yield (MSY) and was probably rarely less than 1.5 times the MSY. This suggested rate of exploitation is dependent upon the mixture of stocks that were fished and the actual sequence of exploitation rates that took place. Thus, these historical catches have aroused expectations that cannot be matched by the best regulated fishery.
[6 figures, 2 tables, 13 references] SW

9.16 EFFECTS OF ANHYDROUS AMMONIA ON A CENTRAL TEXAS POND, AND A REVIEW OF PREVIOUS RESEARCH WITH AMMONIA IN FISHERIES MANAGEMENT

Champ, M. A., J. T. Lock, C. D. Bjork, W. G. Klussmann, and J. D. McCullough, Jr. (Texas A. & M. Univ., College Station, Tex.)
Chemical Abstracts 79, No. 14, 83320j (Oct. 8, 1973)

9.17 TOWED UNDERWATER CAMERA VEHICLES FOR FISHERY RESOURCE ASSESSMENT

Foulkes, T. J., and J. F. Caddy (Fisheries Research Board of Canada Biological Station, St. Andrews, New Brunswick, Canada)
Underwater Journal and Information Bulletin 5, No. 3, 110-116 (June 1973)

This article is a review of the methods and equipment used to house cameras in underwater work. The following considerations must be taken into account in the design of such equipment: (1) handling of towed vehicles at sea, (2) expendability or recovery, (3) hydrodynamics, and (4) fish behavior. Three main forms of tethered camera vehicles (towed from surface vessels) have evolved: vehicles designed to be lowered to the seabed and triggered when on or near it, sleds towed in contact with the seabed, and towed fish-type vehicles which fly above the seabed controlled by divers or in response to sensors on the vehicle.

Three vehicles were designed by members of the staff of the Fisheries Research Board of Canada in response to three resource-survey problems. The first vehicle designed was the drifting underwater collapsible camera sled (DUCCS). DUCCS was designed to meet the requirements of a backup system for a manned-submersible survey of herring spawn in about 100-m depth-waters. DUCCS was used whenever adverse weather prevented operation of the submersible. In another survey problem, a camera vehicle was required to study the distribution of the queen crab resource in the Gulf of St. Lawrence. The area to be surveyed was extensive, over a fairly level sea floor, and at depths to 400 m. The survey was to be made from centerwell-type side trawlers at speeds up to 3 m/s. The vehicle designed for this investigation was a towed underwater automatic camera sled (TUACS). This was a low-mass

9.19 (8.42) MERCURY IN THE MARINE ENVIRONMENT: CONCENTRATION IN SEA WATER AND IN A PELAGIC FOOD CHAIN

Williams, P. M. (Institute of Marine Resources, Scripps Institution of Oceanography, University of California, San Diego, La Jolla, CA 92037), and H. V. Weiss
Journal of the Fisheries Research Board of Canada 30, No. 2, 293-295 (Feb. 1973)

The purpose of this study was to determine if mercury may be increasingly concentrated along successively higher trophic levels of marine food chains and if the level of mercury in the seawater column is affected by biological activity. Organisms, seawater, and sediment were collected at one open-ocean station (29°00.0' N., 122°31.2' W.) 430 km southeast of San Diego, Calif. The mercury content of the samples was determined by a neutron activation technique. The mercury level in zooplankton increased slightly with depth of sample collected. The mercury concentration in almost all the higher trophic levels of organisms collected at greater depth was similar to that in zooplankton collected at these depths Below 100 m, the mercury content of the seawater was fairly constant. Apparently, biological activity does not account for the vertical profile of mercury in seawater. The following tables give some data on the mercury content of seawater and marine organisms.

Distribution of mercury in the sea

Depth of water sample (meters)	Concentration of mercury (parts per trillion)
10	270
100	96
210	45
330	41
520	29
960	35
1,980	42
3,040	44
4,080	55

9.19 (9.4) DETERMINATION OF BUDGETS OF HEAVY METAL WASTES IN LONG ISLAND SOUND ANNUAL REPORT. PART I AND PART II

Dehlinger, Peter, W. F. Fitzgerald, S. Y. Feng, D. F. Paskausky, R. W. Garvine, and W. F. Bohlen (University of Connecticut, Marine Sciences Institute, Groton, CT 06340)
Marine Sciences Institute, University of Connecticut, Groton, CT 06340 (June 1973), 166 pp.

This is a report of the first year's activities of a long-term research program of the heavy metal wastes of Long Island Sound. Five integrated projects are involved in determining the budgets of these heavy metal wastes in the sound, involving studies of (1) the fate and concentrations of heavy metals in the water column, (2) the concentrations and effects of these metals in oysters, (3) the water circulation patterns which control water renewal times and flushing rates, (4) the structure and motion of the outflow of the Connecticut River into the sound, and (5) the transport of suspended materials in the sound. The first section of the annual report contains the summary and conclusions, the introduction and statements of the research status, procedures, and results. The last section consists of five appendixes reporting the results of the research studies as follows:

"Budgets of Heavy Metal Wastes in Eastern Long Island Sound: Chemical Investigations," by W. F. Fitzgerald, C. D. Hunt, W. B. Lyons, and R. J. Szechtman. pp. A1-A51. [10 figures, 12 tables, 16 references]

"Trace Elements in Oysters From Connecticut," by S. Y. Feng and G. M. Ruddy, pp. B1-B5. [1 table]

9.19 (8.42) CONCENTRATIONS OF SOME TRACE METALS IN PELAGIC ORGANISMS AND OF MERCURY IN NORTHEAST ATLANTIC OCEAN WATER

Leatherland, T. M., J. D. Burton (Dept. of Oceanography, The University, Southampton, England), F. Culkin, M. J. McCartney, and R. J. Morris
Deep-Sea Research 20, No. 8, 679-685 (Aug. 1973)

Modern analytical techniques allow accurate measurements of chemical elements to be made on biological samples. Furthermore, there is growing concern about the effects of trace metals and radioactive nuclides, present in domestic and industrial wastes, on oceanic organisms. Investigations were performed to determine the presence of trace metals in pelagic zooplankton, crustaceans, and fishes collected mostly off the coasts of northwest Africa and the Azores.

The results of the analyses showed that the concentrations of mercury ranged from 0.06 to 0.38 p/m dry weight (in the zooplankton and the fishes) and showed no trend in the various trophic levels. There were wider variations in concentrations of cadmium in the organisms than of mercury; in addition, the concentrations of cadmium were lower in fish tissue than in the other organisms. The average concentration of arsenic in the crustaceans was 25 p/m dry weight; the concentrations were lower in the fish tissues also. Values for antimony concentrations in the organisms were below 0.1 p/m dry weight. The concentrations of zinc varied between 28 and 105 p/m dry weight and appeared to be lower in fish tissues than in zooplankton. Concentrations of mercury in seawater taken from various locations in the northeast Atlantic Ocean ranged from 17 to 142 ng/l; the highest concentrations were found in water below 2,170 m in depth.
[1 figure, 3 tables, 29 references] SW

9.19 (9.4)

"Circulation in Eastern Long Island Sound," by D. F. Paskausky, A. J. Nalwalk, and D. L. Murphy, pp. C1-C24. [6 figures, 1 table, 8 references]

"Physical Features of the Connecticut River Outflow During High Discharge," by R. W. Garvine, pp. D1-D54. [19 figures, 1 table, 19 references]

"An Investigation of Suspended Material Transport in Eastern Long Island Sound," by W. F. Bohlen, pp. E1-E29. [14 figures, 2 tables, 11 references]

Some of the results of the investigations are: (1) The eastern section of Long Island Sound is effectively flushed by tidally driven currents so that any material entering this area will be effectively mixed and removed by water circulation in a few days time. Thus, the eastern sound is not a sink for heavy metal wastes. (2) The tidal circulation patterns of the eastern sound are highly variable. (3) The outflow of the Connecticut River shows a distinct plume with sharp boundaries or fronts and of a few meters in depth. (4) Mercury, copper, and lead in the water column of the eastern Long Island Sound are organically and inorganically associated. (5) Suspended material in the eastern sound is mostly clay and organic matter. (6) The oysters along the Connecticut coast showed substantial uptake of Hg, Cu, Cd, Mn, Ni, and Zn, but not to the level considered dangerous for human consumption. It appears that the oysters can serve as a biological monitor of heavy metals in the bays and estuaries of Long Island Sound.

A technique for the analysis of trace amounts of mercury was developed that provided a way to distinguish between organic and inorganic forms of mercury. FTP

9.19 (8.42) ARSENIC, CADMIUM, COPPER, MERCURY, AND ZINC IN SOME SPECIES OF NORTH ATLANTIC FINFISH

Windom, H., R. Stickney, R. Smith, D. White, and F. Taylor (Skidaway Institute of Oceanography, 55 West Bluff Road, Savannah, GA 31406)
Journal of the Fisheries Research Board of Canada 30, No. 2, 275-279 (Feb. 1973)

This report contains data on the heavy metal contents of marine fish of the North Atlantic Ocean; the work was part of the baseline study of the International Decade of Ocean Exploration on the quality of the marine environment. Ninety-one samples representing 35 species of North Atlantic fish (Chondrichthys and Osteichthys) were analyzed for arsenic, cadmium, copper, mercury, and zinc. The samples included members of inshore and offshore species.

In the muscle tissue of 77 samples of Osteichthys (14 families, 26 species), the As content ranged from <1.0 to 6.4 µg/g (dry weight); the Cd content, from <0.1 to 1.6; the Cu, from <0.3 to 23.0; the Hg, from 0.1 to 4.5; and the Zn from 7 to 397. In the muscle tissue of the 14 samples of Chondrichthys (6 families, 9 species), the As content ranged from <1.0 to 19.0 µg/g (dry weight); the Cd content, from <0.1 to 2.1; the Cu content, from 1.5 to 3.2; the Hg content, from 1.0 to 5.3; and the Zn content, from 8 to 20. The metals occur at about similar levels in the inshore and offshore species. The arsenic level in the Chondrichthys is higher than that in the Osteichthys, but the levels of the other metals are about the same. Of the various tissues analyzed, the liver had the higher level of metals except for mercury which was higher in the muscles.
[1 figure, 3 tables, 6 references] FTP

9.17

sled that depended upon hydrodynamic forces to keep it on the seabed while under tow. In another investigation, rapid surveys were required of limited areas around the coast of Prince Edward Island. The surveys were made to determine the effects of raking for seaweed on the lobster fishery. The seaweed beds were in water less than 20 m in depth over a rocky bottom. There were many buoy lines and lobster pots that interfered with the survey. The vehicle designed to overcome these problems was the towed underwater research plane (TURP). TURP was a towed fishlike manned vehicle that had maneuverability to avoid obstacles.

The design features and deployment of the vehicles are shown in diagrams and photographs. Costs are described, and possible future improvements to the vehicle designs are discussed.
[10 figures, 17 references] SW

Besch, W. K., I. Juhnke, and A. Kemball (Landesstelle Gewaesserkd. Wasserwirtsch. Planung, Karlsruhe, Germany)
Chemical Abstracts 79, No. 2, 9584g (July 16, 1973)

9.19 STANDARDIZATION OF THE USE OF FISH TO DETECT DANGEROUS CONDITIONS

9.19 (8.42)

Description of the marine sample		Mercury content	
Organism (sample)	Depth collected	Wet basis	Dry basis
	m	ppb	ppb
Zooplankton (45% copepods)	30	16	123
Zooplankton (60% copepods)	30	6	55
Skipjack tuna (flesh)	(surface)	180	720
Squid (flesh)	(surface)	56	280
Hatchet fish (whole)	550	22	157
Snipe eel (flesh)	600	26	186
Fish, Cyclothone sp.	600	34	261
Penaeid decapods	600	30	332
Mysid (whole)	1,000	65	406
Fish, Nansenia sp. (whole)	1,000	22	122
Fish, Bathylogus sp. (flesh)	1,200	420	2.800
Zooplankton (45% copepods)	1,200	35	388
Fish, Cyclothone sp. (whole)	1,900	55	323
Zooplankton (60% copepods)	3,200	36	189
Brittle star (whole)	4,300	163	280
Sponge,(whole)	4,300	300	1,580
Sediment, pelagic clay [1]	4,300	18	39

[1] Includes benthic organisms and bottom sediment.

[2 tables, 7 references] FTP

9.19 RESIDUES IN FISH, WILDLIFE, AND ESTUARIES. ORGANOCHLORINE RESIDUES IN ESTUARINE MOLLUSKS, 1965-72 -- NATIONAL PESTICIDE MONITORING PROGRAM

Butler, Philip A. (Office of Pesticide Programs, U.S. Environmental Protection Agency, Gulf Breeze, FL 32561)
Pesticides Monitoring Journal 6, No. 4, 238-362 (Mar. 1973) Published by U.S. Environmental Protection Agency, 4770 Buford Highway, Bldg. 29, Chamblee, GA 30341.

Part I. General Summary and Conclusions

In the investigations to determine the effects of pesticides on estuarine organisms, mollusks were selected as reliable indicators of the degree of pesticide pollution in the water. Various species of clams, mussels, and oysters were used as bioassay tools in the investigations. Samples of mollusks living in estuaries of 15 coastal states were collected, in the period 1965-72, and analyzed for aldrin, chlordane, DDT and its analogs, dieldrin, endrin, heptachlor, heptachlor epoxide, lindane, methoxychlor, mirex, and toxaphene. The bodies of the animals were homogenized, and extracted with petroleum ether in a Soxhlet apparatus. The extracts were diluted with acetonitrile saturated with petroleum ether and evaporated to dryness; the residue was eluted from a Florisil column. An electron capture gas chromatographic procedure was used to identify and quantify any pesticide residues in the eluted extract.

DDT and dieldrin were found in some samples from every state monitored. The presence of other pesticides was infrequent and at low levels except for toxaphene. A large number of samples from Georgia contained toxaphene which originated from

9.19 VARIATION WITH CHAIN LENGTH IN ACUTE TOXICITY OF ALKYLHYDROXAMIC ACIDS TO SALMON (SALMO SALAR) FRY

Addison, R. F. (Fisheries Research Board of Canada, Marine Ecology Laboratory, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada), and R. P. Côté
Lipids 8, No. 9, 493-497 (Sept. 1973)

Fatty acids and some of their derivatives have been used as ore flotation agents. Recently, articles have appeared in the literature that describe the use of hydroxamic acids as flotation agents. These compounds have the structure RCONHOH where R is an alkyl group. Such a flotation agent, used experimentally in Canada, was found to be toxic to brook trout. It is possible that the toxicity of the hydroxamic acids might vary with chain length. In this study, the researchers determined the toxicity of saturated n-alkylhydroxamic acids to salmon fry using acids of chain lengths from n-$CH_3CONHOH$ to n-$C_{15}H_{31}CONHOH$. Acute toxicity was considered as the LT50, time to death of 50% of the test group. Within the series of from n-$C_6H_{13}CONHOH$ to n-$C_{10}H_{21}CONHOH$, the acute toxicity to the salmon fry increased with increasing chain length of the alkylhydroxamic acid. Under similar conditions of the test, the compounds of shorter and longer chain lengths were not toxic.
[1 figure, 2 tables, 21 references] FTP

9.19 PESTICIDES IN WATER. ORGANOCHLORINE INSECTICIDE RESIDUES IN STREAMS DRAINING AGRICULTURAL, URBAN-AGRICULTURAL, AND RESORT AREAS OF ONTARIO, CANADA--1971

Miles, J. R. W., and C. R. Harris (Research Institute, Canada Dept. of Agriculture, London 72, Ontario, Canada)
Pesticides Monitoring Journal 6, No. 4, 363-368 (Mar. 1973)

The amounts of pesticide residues in water systems draining agricultural, urban-agricultural, and resort areas of Ontario, Canada were compared. Samples of water, bottom mud, and fish collected in the three drainage areas from mid-April to mid-October 1971 were analyzed. The insecticides that were detected included DDT and its analogs, chlordane, dieldrin, endrin, endosulfan, heptachlor and its epoxide, lindane, and aldrin. The collected water samples were analyzed without pretreatment; the bottom mud and fish samples were subjected to extraction and fractionation on Florisil. Techniques of gas-liquid chromatography (GLC) were then applied to detect the residues.

The residues of total DDT in resort area water (Muskoka River) were found to by 0.11 lb per week per 100 sq mi (average); in the agricultural area (Big Creek), 0.05 lb per week per 100 sq mi; and in the urban-agricultural area (Thames River and the city of London, Ontario), 0.03 lb per week per 100 sq mi. The heaviest contribution of DDT came from the resort area drainage system, although use of DDT had been prohibited since 1966. Fish from this area contained 19 p/m total DDT compared to a high of 1.3 p/m in fish taken from the agricultural area. In addition, total DDT concentration in bottom mud was 800 times higher than that in water, and the concentration of DDT in fish was up to one million times higher than that in

9.19 GENERAL PATHOLOGY OF ENDOCARDIAL REACTIONS. TOXIC ENDOCARDIAL LESIONS IN LOWER VERTEBRATES (CARP)

Schulz, Dorothea (Marx von Pettenkofer-Inst., Berlin, Germany)
Chemical Abstracts 78, No. 13, 80564k (Apr. 2, 1973)

9.19 STRONTIUM-90 TRANSFER FROM FISH TO THEIR OFFSPRING

Kuli'kova, V. G., E. I. Beregovaya, and N. V. Kuli'kov (Inst. Ekol. Rast. Zhivotn., Sverdlovsk, U.S.S.R.)
Chemical Abstracts 78, No. 13, 81555v (Apr. 2, 1973)

9.19

water. Polychlorinated biphenyls (PCBs) were found in the urban-agricultural area samples of bottom mud and fish at concentrations of 217 p/m and 0.4 p/m, respectively. Interference from PCBs in the samples taken from this area prevented direct GLC determination of DDT. In these cases, DDT was converted to corresponding dichlorobenzophenones, separated from PCBs on the Florisil column, and subjected to GLC. Residues of other organochlorine insecticides were detected at much lower concentrations than DDT; they are listed also.
[2 figures, 3 tables, 6 references]

SW

9.19 PCBS (POLYCHLORINATED BIPHENYLS) IN THE FIRTH OF CLYDE

Waddington, J. I., G. A. Best, J. P. Dawson, and T. Lithgow (Clyde River Purif. Board, East Kilbride/Glasgow, Scotland)
Chemical Abstracts 78, No. 26, 163666w (July 2, 1973)

9.19 POLYCHLOROBIPHENYLS IN DANUBE FISHES

Nagy, M. (Staatl. Chem. Untersuchungsanst., Regensburg, Germany)
Chemical Abstracts 78, No. 13, 82207v (Apr. 2, 1973)

9.19 MONITORING ZINC CONCENTRATIONS IN WATER USING THE RESPIRATORY (1.92) RESPONSE OF BLUEGILLS (LEPOMIS MACROCHIRUS RAFINESQUE)

Sparks, Richard E., John Cairns, Jr., Roger A. McNabb, and Glenn Suter II (Dep. Biol., Virginia Polytech. Inst., Blacksburg, Va.)
Chemical Abstracts 79, No. 2, 9508k (July 16, 1973)

9.19

the effluent of a single manufacturing plant. The incidence of DDT residues varied markedly from mollusks of one drainage basin to mollusks of another, and the amount of DDT residue in the mollusks was low compared to that reported in fish eating birds. From these data the estuarine levels of DDT were determined to be intermittent and low (parts per trillion). In drainage basins containing intensive agricultural operations (California, Florida, and Texas) resudies in samples from the mollusks exceeded 1.0 p/m.

The overall picture of DDT residue levels in estuaries is that of a pronounced decline in the number of samples containing residues in excess of 100 ppb and a large increase in the number of samples containing negligible or undetectable amounts.

Part II. Residue Data -- Individual States

Residue data for the following states are presented: On the Atlantic Coast, New York, New Jersey, Maine, Delaware, Maryland, Virginia, North and South Carolina, and Georgia. The Gulf Coast States sampled were Florida, Alabama, Mississippi, and Texas. On the Pacific Coast, California and Washington were sampled. In tabular form, the data show monthly pesticide residue concentrations in the years of the study, and the mollusk species sampled are also identified. A list of the cooperating state agencies and private contractors, with the names of the investigators involved, is provided.
[17 figures, 30 tables, 17 references]

SW

9.19 MERCURY METHYLATION IN AN AQUATIC ENVIRONMENT

Langley, D. G. (Lab. Div., T. W. Beak Consult. Ltd., Toronto, Ontario, Canada)
Chemical Abstracts 78, No. 13, 80477j (Apr. 2, 1973)

9.19 A STRESS SYNDROME IN THE HARD CLAM, MERCENARIA MERCENARIA
(1.82)

Jeffries, H. Perry (Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02881)
Journal of Invertebrate Pathology 20, No. 3, 242-251 (Nov. 1972)

The responses of marine invertebrates to a seasonally changing environment are difficult to distinguish from the effects of pollution and other complications. To recognize the distinctions, a set of easily measured normal physicochemical characteristics is needed that shows the status of homeostatic regulation within a species and its community. Departures of the physicochemical values from those of the normal state would represent symptoms of internal stress. If the symptoms are taken together as a syndrome, the identification of the causes of stress may be recognized. To determine a stress syndrome, observations of morphological changes, histological variations, infection, carbohydrate levels, and the patterns of free amino acids and fatty acids were made on clams from polluted and clean habitats.

The results of the study indicate that in stressed clams there is a high taurine concentration, but the total amino-acid concentration is less than in normal clams. Of the fatty acids present in stressed clams there were low levels of those fatty acids with the 20:5 ratio and a tendency for slightly higher ratios of palmitoleic acid (16:1) to palmitic acid (16:0) than in normal clams. Other indicators of stress in clams are lower concentrations of glycine and carbohydrates than in normal clams. For practical purposes, the author suggests that the ratio of taurine to glycine may be sufficient to recognize abnormalities in the hard clam: a taurine/glycine molar ratio of 2.5-2.9 he considered normal; more than 3.0 symptomatic; and 5.0-6.6 indicative of infection.
[2 figures, 6 tables, 24 references]

SW

9.19 EFFECTS OF A ROUTINE RADIOACTIVE RELEASE ON AQUATIC RADIONUCLIDE CONCENTRATIONS

Nelson, D. M., G. P. Romberg, W. Prepejchal, and S. A. Spigarelli (Radiol. Phys. Div., Argonne Natl. Lab., Argonne, Ill.)
Chemical Abstracts 79, No. 2, 9473v (July 16, 73)

9.19 OBSERVATIONS ON THE EXPERIMENTAL CONTAMINATION OF THREE SPECIES OF SEA FISH: PLEURONECTES PLATESSA, CALLIONYMUS LYRA, AND TRACHINUS VIPERA CUV., BY CESIUM-137 AND COBALT-60

Fraitzer, A., and J. Ancellin (Commis. Energ. At., Cherbourg, France)
Chemical Abstracts 79, No. 5, 29064r (Aug. 6, 1973)

9.19 (1.952) PREMATURE BIRTHS IN CALIFORNIA SEA LIONS: ASSOCIATION WITH HIGH ORGANOCHLORINE POLLUTANT RESIDUE LEVELS

DeLong, Robert L. (Marine Mammal Division, National Marine Fisheries Service, NOAA, Seattle, WA 98115), William G. Gilmartin, and John G. Simpson
Science 181, No. 4105, 1168-1170 (Sept. 21, 1973)

Premature pupping in California sea lions has been reported on the breeding grounds on islands off the coasts of California and Baja California, Mexico. Studies were conducted to determine whether environmental pollutant residues were related to the premature births. Premature births occur from January through mid-May. Premature pups born in January die soon after birth; those born in March, April, and early May live either for a few hours or for several days. After May 15, the death rate decreases and some premature pups survive. On San Miguel Island (California) 242 dead premature pups were counted on Apr. 25, 1970 and 348 on May 18, 1971 from an estimated total population of 10,000 to 15,000. On San Nicolas Island (in the same group as San Miguel) 442 dead premature pups were counted between Jan. 17 and May 3, 1970 by another investigator. He found the female population to be about 5,500.

Within 24 h of giving birth, a group of six postpartum females and their premature pups were collected. A group of four full-term live pups and their mothers were also collected. The liver, brain, and blubber from the cows and pups were analyzed for DDT and its metabolites, dieldrin, and polychlorinated biphenyls (PCB). Organochlorine pesticide and PCB residues were found in all of the tissues that were collected. In the females which gave birth prematurely, DDT residues in blubber and liver were 8.0 and 3.8 times greater, respectively, than in the same

9.19 DIELDRIN. EFFECTS OF CHRONIC SUBLETHAL EXPOSURE ON ADAPTATION TO THERMAL STRESS IN FRESHWATER FISH

Silbergeld, Ellen K. (Stroud Water Research Center, Dept. of Limnology, Academy of Natural Sciences of Philadelphia, Avondale, PA 19311)
Environmental Science & Technology 7, No. 9, 846-849 (Sept. 1973)

The adaptation of low-level, chronic exposure to dieldrin, an organochlorine insecticide, may be achieved by fish only at the expense of losing resistance to environmental stresses. Organochlorine insecticides are well known environmental pollutants; thus, organisms in the environment experience chronic exposure. Other reports indicate that chronic exposure is equivalent to pretreatment in many organisms including possibly, man. Experiments were performed to examine the concept of insecticide pretreatment in fish and subsequent interaction with environmental change. Wild, mature darters, a small fish related to the perch, were captured from a stream that had levels of insecticide pollution below 1 ppb. The fish were divided into three equal groups; fish exposed to dieldrin, fish exposed to thermal stress alone, and controls. Sixty fish were exposed to 2.3 ppb dieldrin, less than one-fourth the LC_{50} for the species. After 30 days, the fish exposed to dieldrin, and 60 unexposed fish, were subjected to increases in water temperature. Thermal stress was applied at the rate of 1° C increase per day to a maximum of 7°-9° C above the ambient temperature of the home stream of the fish. The elevated temperatures were maintained for 4 days, and the experiment was terminated on the tenth day of thermal stress.

9.19 (9.6) PCB IN WATER: A BIBLIOGRAPHY

Anonymous
Water Resources Scientific Information Center, Office of Water Resources Research, U.S. Dept. of the Interior, Washington, DC 20240 (Mar. 1973), iv + 144 pp. Available from the National Technical Information Service, Springfield, VA 22151. Order No. WRSIC73-201, $3.00, $0.95 in microfiche.

This bibliography has a significant descriptor index, a comprehensive index of descriptors and identifiers, and an author index. Each article is abstracted with full bibliographic details and is listed in ascending accession number order.

SW

9.19 CONTAMINATION OF CANADIAN ATLANTIC COASTAL AREAS WITH POLYCHLORINATED BIPHENYLS (PCB), POLYCHLORINATED TERPHENYLS (PCT), AND RELATED COMPOUNDS

Zitko, V., and O. Hutzinger (Environ. Canada, St. Andrews, New Brunswick, Canada)
Chemical Abstracts 79, No. 2, 953r (July 16, 1973)

9.19

The results indicate that during thermal stress 13% of the fish not exposed to dieldrin died; in contrast, 76.5% of the fish exposed to dieldrin died. Metabolic indicators, such as blood glucose levels, feeding activity, growth, oxygen consumption, opercular movement, whole body lipid content, and liver condition, were measured during the experiment. During the first 15 days of exposure to dieldrin, the fish exhibited significant changes in these indicators except for opercular movement. After 15 days there were reversals in the changes (except for liver damage), indicating that the fish had adapted to dieldrin. In terms of the same indicators, the fish adapted to dieldrin remained different from the unexposed fish. The author concluded that exposure to dieldrin impaired the ability of the fish to make metabolic adjustments required by the increase in the environmental temperature.
[2 figures, 2 tables, 31 references] SW

9.19 DDT IN SOME NEW ZEALAND MARINE AND FRESH WATER FAUNA

Soliy, S. R. B., and D. L. Harrison (Wallaceville Anim. Res. Cent., Minist. Agric. Fish., Wellington, New Zealand)
Chemical Abstracts 79, No. 13, 74614f (Oct. 1, 1973)

9.19 NONIONIC SURFACTANTS WITH LOW TOXICITY TO FISH

Iwatsuki, Toshihiro, and Kazuhiro Murai (pat.) (Sanyo Chemical Industries, Ltd.)
Japan. Kokai 73 14,594
Chemical Abstracts 79, No. 2, 7167z (July 16, 1973)

9.19 TOTAL MERCURY IN SOME AGRICULTURAL AND INDUSTRIAL FISH BREEDING GROUNDS AND IN VARIOUS RIVERS AND LAKES IN CENTRAL ITALY

Caracciolo, S., C. Di Silvestro, A. Loretti, A. Perna, and N. Travaglini (Ig. Controllo Vet. Pesca, Ist. Sper., Pescara, Italy)
Chemical Abstracts 78, No. 26, 163655s (July 2, 1973)

9.19 (1.95)

MERCURY-SELENIUM CORRELATIONS IN MARINE MAMMALS

Koeman, J. H., W. H. M. Peeters, C. H. M. Koudstaal-Hol (Dept. of Toxicology, Agricultural University, Wageningen, The Netherlands), P. S. Tjioe, and J. J. M. De Goeij (Interuniversity Reactor Institute, Delft, The Netherlands)
Nature 245, No. 5425, 385-386 (Oct. 19, 1973)

Samples of liver and brain tissues from specimens of the common seal (Phoca vitulina) found dead in Netherlands waters were examined for mercury. Mercury levels of 225-765 p/m (wet weight) were found in liver tissue and 9.9 to 31 p/m in brain tissue. Other reports of animals experimentally poisoned with methylmercury, and the high levels of mercury found in the seal brain tissue are suggestive that the seals were affected by the toxicity of methylmercury. Cadmium, arsenic, selenium, zinc, and antimony were studied in seal tissues. Selenium was present at concentrations of 46-134 p/m (wet weight) in the livers of five seals in which the Hg concentrations ranged from 257 p/m to 326 p/m. The levels for Cd were 0.05-0.30 p/m, for As 0.20-1.7 p/m, and for Zn 25-34 p/m; the level of Sb was lower than the detection limit of 0.01 p/m. Further analyses for Hg and Se were conducted on juvenile and adult seals, porpoises, and dolphins. Based on results of these studies the authors suggest that the concentration of Hg in the livers of the marine mammals is strongly correlated with the concentration of Se, but not with the other elements. They further suggest that the correlation reflects a causal relationship between Hg and Se in marine mammals. These results support the findings of other workers who have reported that Hg and Se occur together in animal tissues and are associated to proteins by means of sulfur.
[1 figure, 2 tables, 15 references] SW

9.19 (1.952)

tissues from females with full-term pups. The concentration of DDT in the brain tissue of premature pups was twice that in the brain of full-term pups. In the females which pupped prematurely, the concentrations of PCBs in the blubber, liver, and brain were 6.6, 4.4, and 2.4 times higher, respectively, than those in the same tissues from females that pupped normally. Dieldrin residues were detected in some samples of tissue and the levels found were low. The authors suggest that the magnitude of the differences in residue levels found in the two groups of sea lions can be considered for a possible cause and effect relationship.
[1 figure, 1 table, 18 references] SW

9.19 POLLUTION OF THE "EL CARPINCHO" POND (PAMPASIC REGION, ARGENTINA) AND ITS EFFECTS ON PLANKTON AND FISH COMMUNITIES

Freyre, Lance (Inst. Limnol., Univ. Nac. La Plata, La Plata, Argentina)
Chemical Abstracts 78, No. 26, 163663t (July 2, 1973)

9.19 (9.3) OFFSHORE DEVELOPMENT AND MARINE POLLUTION

Hardy, Michael (Office of Legal Affairs, United Nations Secretariat, New York, N.Y.)
Ocean Development and International Law Journal 1, No. 3, 239-273 (Fall 1973)

This paper was prepared for a Regional Conference on the Petroleum Industry in Africa that was organized by the Economic Commission for Africa. The Conference was originally scheduled to be held in October 1972 but was rescheduled for some time in the fall of 1973. The paper is divided into four parts. The first part defines marine pollution and its causes. The definition of marine pollution prepared and adopted by various bodies of the United Nations follows:

"Introduction by man, directly or indirectly, of substances or energy into the marine environment (including estuaries) resulting in such deleterious effects as harm to living resources, hazard to human health, hindrance to marine activities including fishing, impairment of quality for use of sea water and reduction of amenities."

The second part deals with offshore development and marine pollution relative to international law and the actions of various international bodies. The third section contains a survey of national legislation relating to marine pollution caused by offshore mineral development; it covers the legislation and regulations of 18 countries in North America, Europe, Far East, Middle East, Latin America,

9.2 A SYSTEMS APPROACH TO ANALYSIS OF COMMUNICATION OF MANAGEMENT INFORMATION

Schruben, Leonard W. (Kansas State University, Manhattan, Kans.)
Feedstuffs 45, No. 42, 25, 28 (Oct. 8, 1973)

A procedure is described to organize an inquiry into: (1) Who communicates what information to whom? (2) Who needs what information? and (3) How can the communication system be arranged to ensure that people get information as required without unnecessary effort? A communications matrix is defined as a communication system that has been assembled with a set of format rules governing the content of each element of the matrix. Subsystems representing individual parts of a company are connected with each other in the matrix. The communications matrix is comparable to the table on a roadmap showing distances between cities. To find the distance between two cities the common element in the table is traced. In the communications matrix the common element can be found between two subsystems, such as between the purchasing group and the receiving group. An example of a communications analysis matrix is provided with an explanation for its use, and a communications flow chart is also shown.
[2 figures] SW

9.19 MERCURY CONTAMINATION OF MARINE LIFE IN PERU

Bouroncle C., Alfonso, Medardo Echegaray R., and Juan Chang Say Y. (Min. Salud Peru, Peru)
Chemical Abstracts 79, No. 6, 34865g (Aug. 13, 1973)

9.19 CONTAMINATION OF SOME COASTAL AREAS OF THE BLACK AND BALTIC SEAS BY CARCINOGENIC HYDROCARBONS (1.0144)

Gortalum, G. M., and L. P. Smirnova (U.S.S.R.)
Chemical Abstracts 79, No. 16, 96614h (Oct. 22, 1973)

9.2 (9.3) THE AMERICAN LOBSTER FISHERY: ECONOMIC ANALYSIS OF ALTERNATIVE MANAGEMENT STRATEGIES

Bell, Frederick W. (National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, and Richard F. Fullenbaum (Office of Management and Budget)
Marine Fisheries Review 35, No. 8, 1-6 (Aug. 1973)

The authors' purpose was to explain the use of bioeconomic models in assessing alternative fishery management strategies. The data base for the American lobster fishery was used in the analyses, but the data were considered less than optimal. The authors first consider some of the basic elements used in constructing a bioeconomic model of the American lobster fishery and then they evaluate the economic impact of five alternative policies that could be adopted to manage the entire inshore fishery for lobsters. All the management strategies are assumed to have some central authority to impose the regulations; furthermore, they have two common objectives: (1) to protect the resource from overexploitation and (2) to allow maximum freedom for operators to function in a free enterprise.

The inshore American lobster resource appears to have reached maximum sustained yield and the industry is fully capitalized. (The maximum sustained yield means the largest number of pounds of the resource that can be caught on a long-run annual basis with a given level of fishing effort without impairing the viability of the stock. A capitalized fishery represents the inputs of vessels, fishermen, gear, and technology used to harvest a fishery resource.) This situation has been brought about by a rapid expansion of fishing effort resulting from

9.2 MARINE OCCUPATIONS IN THE TEXAS COASTAL ZONE

McKinnerney, Beryl, and Donald L. Clark (College of Education, Texas A. & M. University, College Station, TX 77840)
Sea Grant Publication No. TAMU-SG-73-606, Sea Grant College and College of Education, Texas A. & M., College Station, TX 77840 (July 1973), xv + 72 pp.

This report was prepared for high school students, counselors, teachers, and curricular developers having interest in information in marine related occupations. The material was obtained through reviews of occupational publications and by interviews with people associated with marine occupations in Texas. The various industries and activities were divided into the following groups: fish and foods, harbor maintenance and activities, merchant marine industry, marine recreation and tourism, research and development, petroleum industry, and shipbuilding and repair. The report describes the basic occupations related to these industries, with the exception of marine recreation and tourism.
[1 figure, 4 tables, 16 references] FTP

9.19 SELECTED METALS IN SEDIMENTS, WATER, AND BIOTA IN THE ILLINOIS RIVER

Mathis, B. J., and T. F. Cummings (Dep. Biol., Bradley Univ., Peoria, Ill.)
Chemical Abstracts 79, No. 14, 83145f (Oct. 8, 1973)

9.2 (9.3)

(1) free access to the resource, (2) a rising market for lobsters, and (3) a decline in seawater temperature (increases in seawater temperature cause the lobsters to grow more rapidly thus the catch per trap in weight is increased).

Five alternative management strategies are discussed as follows: (1) Impose a freeze on existing (1969) lobster fishing effort by placing a license fee on traps. Under this scheme, the regulatory agency would impose a license fee on traps at a rate that would tend to keep the level of fishing effort constant despite any increase in demand for lobsters. (2) Reduce the existing level of lobster fishing effort to that necessary to harvest the maximum sustained yield by placing a license fee on traps. Under this scheme, a license fee per trap would be assessed at a rate that would reduce the level of existing effort to that necessary to harvest the maximum sustained yield despite an increase in the demand for lobsters. (3) Reduce the existing level of lobster fishing effort to that necessary to make the marginal cost of landing them equal to ex-vessel price by placing a license fee on traps. This strategy is designed to obtain the greatest "net economic benefit." (4) Issue "stock certificates" to each vessel owner based on average catch over the last 5 years and to fix the existing level of lobster fishing effort. This scheme provides for the recognition of the historic fishing rights of each fishing firm. The stock certificate would be evidence of private ownership, and the fisherman would be free to catch his allotted share of lobsters or to sell his stock certificates. (5) Imposition of no management strategy. The consequences of doing nothing would be overcapitalization and eventual reduction in the catch of lobsters.

The choice of management strategies for the inshore American lobster fishery was not discussed.
[2 figures, 1 table, 7 references] FTP

9.19 (9.3)

and Africa. The last part is a series of reflections on marine pollution and the necessity for new legislative and regulatory measures in the various countries engaged in offshore development.
[73 footnotes] FTP

9.19 TOXICITY OF METHYLMERCURY (0.4)

Skerfving, Staffan (Sweden)
Chemical Abstracts 79, No. 5, 27983r (Aug. 6, 1973)

9.2 HUNTERS, TRAPPERS, AND GATHERERS OF THE SEA: A COMPARATIVE STUDY OF FISHING STRATEGIES

Cove, J. J. (Dept. of Sociology and Anthropology, Carleton University, Ottawa, Ontario, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 2, 249-259 (Feb. 1973)

The author compared fishing strategies in the Newfoundland offshore fishery, the inshore fishery of British Columbia, and an oyster fishery of Cornwall, England. From the Newfoundland fishery, he developed a model to account for differences in risk-taking by fishing captains. In this model, relations between reward structure, technology, and environment were specified that influenced the fishing captains' evaluations and hence their decisions.
[2 tables, 27 references] FTP

9.19 USE OF FISH AS SENSORS IN INDUSTRIAL WASTE LINES TO PREVENT FISH KILLS (1.92)

Cairns, John, Jr., Richard E. Sparks, and William T. Waller (Dep. Biol., Virginia Polytech. Inst., Blacksburg, Va.)
Chemical Abstracts 79, No. 5, 28054a (Aug. 6, 1973)

9.2 (9.3) EXTRACTING RENT FROM OCEAN RESOURCES: DISCUSSION OF A NEGLECTED SOURCE

Pearson, Charles S. (School for Advanced International Studies, Johns Hopkins University, Washington, D.C.)
Ocean Development and International Law Journal 1, No. 3, 221-237 (Fall 1973)

The author discusses a proposal relative to ocean dumping of wastes in which the international community would establish a system of taxation or charges on ocean dumping, with revenues being equally distributed in accordance with the "common heritage of mankind" concept of ocean resources. This paper, he indicates, represents a preliminary examination of the subject designed to stimulate further discussion and more exacting analysis. The paper is in two sections: Section I is a brief overview of ocean dumping and control instruments, and Section II deals with the rationale for the proposed tax scheme. Section II is divided into the environmental resource allocation issue and the matter of ocean resource rents. An ocean dumping tax scheme can lead to a significant improvement in resource allocation, thus permitting higher environmental standards at lower real cost. Also, the assimilative capacity of the oceans can be considered as an economic resource from which rent can be extracted by the international community. An ocean dumping tax would alter the present situation in which the rent is appropriated by ocean dumpers.
[34 footnotes] FTP

9.3 FREEDOM FOR SCIENCE IN THE OCEANS

Cadwalader, George (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Science 182, No. 4107, 12-20 (Oct. 5, 1973)

The doctrine of freedom of the seas provided the basis for all law of the sea for almost 300 years. Since 1945, several coastal states have expanded their claims of jurisdiction to include that part of the ocean called the "high seas"; thus, the traditional law of the sea was nullified in these areas. Additionally, the doctrine of freedom of the seas has come under increasing criticism, primarily from the developing countries. In response to these pressures, the U.N. General Assembly called for a new Law of the Sea Conference to begin in 1973. The Seabed Committee, consisting of representatives from 90 nations, is currently engaged in negotiations in preparation for the conference. The author suggests that the conference will inevitably result in some form of national or international control over the ocean space. The extent of the jurisdiction exercised will be a matter for negotiation, and freedom for science will be one of the controversial bargaining points. The case for minimum regulation of science must be constructed on an assessment of what can be achieved in the prevailing political climate, and any bargaining must be made in terms of specific proposals aimed at satisfying those who would restrict or prevent scientific activity in their jurisdictions.

Representatives of the developing countries are requesting new laws governing uses of the sea in order to gain access to the ocean resources which are the common heritage. These representatives argue that seabed resources are denied to the developing nations because of their economic inability to exploit them.

9.3 (9.19)(9.11) U.S. PRESENTS PROPOSAL AT PREPARATORY SESSION FOR LAW OF THE SEA CONFERENCE

Stevenson, John R., John Norton Moore, and Donald L. McKernan (U.S. Dept. of State, Washington, D.C.)
Department of State Bulletin 69, No. 1787, 397-415 (Sept. 24, 1973)

The United Nations Committee on the Peaceful Uses of the Seabed and the Ocean Floor Beyond the Limits of National Jurisdiction met at Geneva during July 2-Aug. 24, 1973. This article contains the individual statements by the authors at this meeting. Stevenson discussed the rights and duties of States in the coastal seabed economic area; Moore discussed protection of the marine environment; and McKernan discussed scientific research in the marine environment.
[9 footnotes] FTP

9.7 (2.11) [PSYCHOLOGICAL PROFILE OF A GOOD MARINER ON THE BASIS OF TESTING STUDENTS OF A MARINE ENGINEERING SCHOOL IN SZCZECIN] PROFIL OSOBOWOŠCI DOBREGO MARYNARZA NA PODSTAWIE BADAÑ STUDENTÒW WSM W SZCZECINIE

Okwieciński, Ireneusz (Studium Wychowania Fizycznego)
Zeszyty Naukowe No. 3, 189-208 (1973) (In Polish, English summary) Wyższa Szkoła Morska Biblioteka, Wały Chrob Ego 1, 70-500 Szczecin, Poland

Ninety-two first year students of the Marine Engineering College (MEC) and thirty-four other undergraduates having 5 years of experience in the merchant marine were given the Thurstone-Choynowski "Scale of Temperaments" psychological test. The objective of the investigation was to estimate the range of development of distinctive features of personality that determine the success of an individual in the profession of seaman. Other work has shown an appreciable difference between students of MEC and students in other schools. On the basis of views expressed by officers in the Polish merchant marine, and students, teachers, and research staff of the MEC, a model of a good seaman was established. The model was compared to the profile of distinctive personality features resulting from the psychological tests given to the students of MEC. The comparison indicated that the students with merchant marine experience approximated the model closer than the first year students. The results also indicated that the features of personality that are of fundamental value in the profession of seamen can be determined rapidly and accurately by using the Thurstone-Choynowski psychological test.
[2 figures, 3 tables, 17 references] SW

9.3 THE DEVELOPMENT OF EUROPEAN REGIONAL LAW OF THE SEA

Janis, Mark W. (Naval Postgraduate School, Monterey, Calif.)
Ocean Development and International Law Journal 1, No. 3, 275-289 (Fall 1973)

The author explores the concept of regional law of the sea as a more practical alternative either to a new global order for the oceans or to extension of national maritime jurisdictions. The author studied the European Common Market's (and three other European groups') maritime activities; in addition, he examined the possible effects of these activities on the development of a European system of regional maritime law.

The European Economic Community (EEC) has taken two important steps towards creating a regional European law of the sea: The EEC Common Fisheries Policy (established by the Council of Ministers on Oct. 20, 1970) and the EEC Commission's decision of Sept. 10, 1970 to apply the treaty of Rome and EEC regulations to the continental shelf. The Common Fisheries Policy opened national territorial waters within the EEC to all Community fishermen and provided the foundation for the generation of Common Market fishing policy. The decision on the continental shelf also brought the exploration and exploitation of hydrocarbons on the shelf within EEC regulations and supervision.

Regional systems of law of the sea have two advantages: first, they are easier to create, and secondly, they are preferable to national extensions of maritime jurisdiction. Regional law of the sea also would provide a single set of regional legal rules in place of any number of national sets in the same region. Regional systems might simplify exploitation of the resources, simplify navigation of the seas, and provide for a better chance for successful control of marine pollution.
[34 footnotes]
FTP

9.3 TOWARDS A NEW REGIME FOR OCEAN DEVELOPMENT

Oda, Shigeru (Tohoku University, Japan)
Ocean Development and International Law Journal 1, No. 3, 291-302 (Fall 1973)

The author points out two distinct trends relative to ocean development and law of the sea: (1) the growing interest of coastal States in offshore resources that may influence developments relative to coastal jurisdiction, and (2) the desire by certain countries for international control of resources of the vast ocean areas. These controls may eventually affect the concept of free competition.
[25 footnotes]
FTP

9.7 PROCEEDINGS VOCATIONAL FISHERIES EDUCATION WORKSHOP

Lund, Marlene, A. (editor)
Published for Pacific Sea Grant Advisory Program by Oregon State University Extension Service, Marine Advisory Program, Corvallis, OR 97331 (1973), v + 46 pp.

The workshop was held Apr. 18-19, 1973 in Portland, Oreg., and was sponsored by Pacific Sea Grant Advisory Program. The workshop began with a series of presentations by specialists following an introduction to the general subject by Howard Brock; John B. Glude defined the U.S. commercial fisheries; Maynard A. Steinberg discussed the future of the fisheries; and R. Barry Fisher explained the needs of a viable commercial fishery.

Four current training programs were discussed as follows: the high school level by Robert Simpler; the community college program by Jackson B. Hargis; the vocational technical school level by John Ronning; and the college program by Graham A. Drew.

A panel discussion of the subject "Industry Reaction" was recorded, with the following participants: R. Barry Fisher, Arthur Paquet, Jay Gage, and Ross Lindstrom.

Small group discussions based on objectives in fisheries education were held followed by a general discussion. The concluding remarks at the workshop were made by William Q. Wick.

The appendices give (1) a list of schools on the west coast and Hawaii that teach marine technology and courses in commercial fishing and (2) the participants in the workshop with their affiliations.
SW

9.3

The doctrine of common heritage provides the right for a state to share in seabed resources independent of its economic power. Representatives of the developing countries favor the doctrine of the common heritage and also the right to claim wide areas of national jurisdiction over ocean space off their coasts. Such national claims would remove from the area of the common heritage most of the seabed resources. This contradiction has not caused the representatives of the developing countries to change their positions since the most advantageous bargaining position is to claim ownership of their parts of the continental shelf and to use the doctrine of common heritage to share in whatever resources lie beyond.

Freedom for scientific investigations of the oceans can be justified on the basis that research may yield knowledge of potential social good, and no state accepting the doctrine of common heritage can properly erect barriers against it.
[11 references]
SW

9.19 MARINE RADIOECOLOGY. AIM AND PROSPECTS

Ehrhardt, Jean Paul (Serv. Sante Armee, France)
Chemical Abstracts 79, No. 14, 83103r (Oct. 8, 1973)

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